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-SPACE SHUTTLE-

STATIC SURFACE PRESSURES OF THE 0.004 SCALE 049 ORBITER IN THE LAUNCH CONFIGURATION

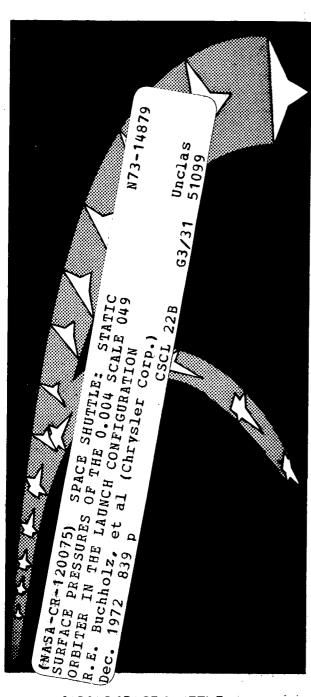
by

Robert E. Buchholz, LMSC/HREC Mickey Gamble, LMSC/HREC

MSFC 14×14-INCH
TRISONIC WIND TUNNEL



This document should be referenced as NASA-CR-120,075



SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER



NASA Series Number: P-1011

DMS-DR-1273 CR-120,075 DECEMBER, 1972

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION:	.004 Scale 049 Orbiter in the Launch Configuration
TEST PURPOSE:	Determine Static Surface Pressures of the Orbiter in the
	Launch Configuration
TEST FACILITY:	NASA/MSFC 14 x 14 - Inch Trisonic Wind Tunnel
TESTING AGENCY:	NASA/MSFC
TEST NO. & DATE:	MSFC TWT 550; July 17-21, 1972 (65 hours)
FACILITY COORDIN	MATOR: Jim Weaver - (NASA/MSFC)
PROJECT ENGINEER	R(S): Robert Buchholz - (LMSC/HREC)
	Mickey Gamble - (IMSC/HREC)

DATA MANAGEMENT SERVICES

TTATCOM.

V. W. Sparks

DATA OPERATIONS:

R. liler

RELEASE APPROVAL:

N D. Kemp, Supervisor Aero Thermo Data Group

CONTRACT NAS 8-4016

AMENDMENT 174

DRL 297 - 84a

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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TABLE OF CONTENTS

				PAGE
ABS T I	RACT			1
NOMEI	NCLATUF	RE		2
CONFI	[GURAT]	IONS INVESTIGATED	•	4
TEST	FACILI	ITY DESCRIPTION		5
DATA	REDUCT	PION		6
TABLE	es			
	I	ORBITER SURFACE PRESSURE TAP LOCATIONS		7
	II	TEST CONDITIONS		8
	III	DATA SET COLLATIONS		9
	IV	DIMENSIONAL DATA		11
	V	INDEX OF MODEL FIGURES		18
	VI	INDEX OF DATA FIGURES		19
FIGUI	RES	. ,		
	MODEL			23
	DATA			29

STATIC SURFACE PRESSURES OF THE 0.004 SCALE 049 ORBITER IN THE LAUNCH CONFIGURATION

By Robert E. Buchholz and Mickey Gamble

ABSTRACT

This test was conducted to obtain wing and lower body surface static pressure data for the Space Shuttle 049 Orbiter while in the launch configuration. The purpose of the test was to determine the optimum incidence position of the orbiter relative to the hydrogen-oxygen (HO) tank and the optimum radial position of the solid rocket motors (SRM) on the HO tank.

The orbiter was mounted on the HO tank at incidence angles of 0 and -1.5 degrees to determine the optimum incidence position. The SRM boosters were tested at radial positions of 75, 90, and 135 degrees on the HO tank to determine their optimum position with respect to the loads imposed on the orbiter.

The test was conducted in the NASA/MSFC 14 x 14-Inch Trisonic Wind Tunnel over a Mach number range of 0.6 to 4.96. Angle of attack was varied from -8 to +8 degrees at zero degree angle of sideslip, and at sideslip angles varying from -6 to +6 degrees at zero degree angle of attack.

NOMENCLATURE General

SYMBOL	SADSAC SYMBOL	DEFINITION
8		speed of sound; m/sec, ft/sec
$C_{\mathbf{p}}$	CP	pressure coefficient; $(p_l - p_{\infty})/q$
М	ма сн	Mach number; V/a
р		pressure; N/m ² , psf
Q	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$, N/m^2 , psf
RN/L	\mathtt{RN}/\mathtt{L}	unit Reynolds number; per m, per ft
v		velocity; m/sec, ft/sec
α	ALPHA	angle of attack, degrees
β	BETA	angle of sideslip, degrees
ψ	PSI	angle of yaw, degrees
ϕ	PHI	angle of roll, degrees
ρ		mass density; kg/m^3 , $slugs/ft^3$
	Refe	erence & C.G. Definitions
Ab		base area; m ² , ft ²
b	BREF	wing span or reference span; m, ft
c.g.		center of gravity
$oldsymbol{\ell}_{ ext{REF}}$ $ar{ ilde{ ilde{c}}}$	LREF	reference length or wing mean aerodynamic chord; m, ft
S	SREF	wing area or reference area; m ² , ft ²
	MRP	moment reference point
	XMRP	moment reference point on X exis
	YMRP	moment reference point on Y axis
	ZMRP	moment reference point on Z axis
SUBSCRIPTS b 1 s t o	<u> </u>	base local static conditions total conditions free stream

ADDITIONS TO NOMENCLATURE FOR MSFC TWT 550

SYMBOL	SADSAC SYMBOL	DEFINITION
^L Local		local chord length.
$^{ m b}{f r}$ ef	BREF	reference span.
X		pressure tap location in the longitudinal direction measured from the nose and from the wind leading edge.
Υ		pressure tap location in the lateral direction measured from the fuselage centerline.
$\phi_\mathtt{S}$	PHIS	radial positions of the SRM boosters relative to HO tank.
io	ORBINC	incidence angle between the orbiter and the HO tank.
x/L_{Local}	X/L	local chord position.
x/L	x/L	longitudinal position.
$Y/(b_{ref}/2)$	Y/B	local semi-span position.
θ	THETA	angle measured from vehicle bottom centerline, degrees.

CONFIGURATIONS INVESTIGATED

Test results reported herein were obtained on a 0.004 scale 049 Orbiter model in the launch configuration (see figures 1 through 5). Each of the model components tested are listed below. Combinations of the components tested are shown in Table III (Data Set Collations). Dimensional data for the components is presented in Table IV.

MODEL COMPONENT SYMBOL	DESCRIPTION
Ol	Baseline 049 Orbiter (including the abort solid rocket motors) (BlW4V11A1)
02	Baseline 049 Orbiter (without the abort solid rocket motors) (BlW4V11)
Tl	346-in. diameter HO tank with 220 nosecone.
Т3	346-in. diameter HO tank with 17° nosecone.
Sl	156-in. diameter solid rocket motor with 170 nosecone (baseline).

TEST FACILITY DESCRIPTION

The Marshall Space Flight Center 14" x 14" Trisonic Wind Tunnel is an intermittent blowdown tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from .2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 through 2.50, and the supersonic section permits testing at Mach 2.74 through 5.85. Mach numbers between .2 and .9 are obtained by using a controllable diffuser. The range from .95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.44, 1.93 and 2.50 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.50 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach number in .25 increments.

Air is supplied to a 6000 cubic foot storage tank at approximately -40°F dew point and 500 psi. The compressor is a three-stage reciprocating unit driven by a 1500 hp motor.

The tunnel flow is established and controlled with a servo actuated gate valve. The controlled air flows through the valve diffuser into the stilling chamber and heat exchanger where the air temperature can be controlled from ambient to approximately 180°F. The air then passes through the test section which contains the nozzle blocks and test region.

Downstream of the test section is a hydraulically controlled pitch sector that provides a total angle of attack range of 20° ($\pm 10^{\circ}$). Sting offsets are available for obtaining various maximum angles of attack up to 90° .

DATA REDUCTION

All static pressures were reduced to the form of pressure coefficients by referencing them to freestream static pressure and dividing by freestream dynamic pressure:

$$CP = (P_{\ell} - P_{\infty})/q$$

Table 1 lists positions of the individual surface pressure taps. The positions are non-dimensionalized by wing semi-span in the lateral direction and by local chord length in the longitudinal direction.

Table 1
ORBITER SURFACE PRESSURE TAP LOCATIONS

Taj	o No.		,	L _{local}	.5bref
Upper	Lower	X/L_{local}	Y/.5bref	(in.)	(in.)
					·
_	11	.046	0.0	5.26	2.23
-	12	.092			
-	13	.152			
_	14	.228	·		
-	15	.304			
-	16	.456			·
-	17	.947		•	
6	18	144	.282	3.306	
7	19	.300	1		
8	20	.470			
9	21	.642			
10	22	.814		•	
. 3	23	229	.553	1.641	
4	24	.515			·
5	25	.729	↓	•	
1	26	.216	.842	.962	
2	27	.721	•		<u> </u>

TABLE II.

TEST CONDITIONS TEST TWT 550

MACH NUMBER	REYNOLDS NUMBER per unit length	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
.6	4.5 × 106	4.0	100
.9	5.7	6.7	
1.0	5.9	7.4	
1.1	6.0	7.9	
1.2	6.1	8.3	
1.46	7.1	10.3	
1.96	7.1	10.3	
4.96	5.4	3.1	
		,	
			·

BALANCE UTILIZED:	No balance	
CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	•	•
SF		
AF		
PM		
YM		***************************************
RM	•	
COMMENTE.		•

TY POSTTEST

						5.2			2 2			9 2	DY d = 2.		-8 +o 8°	α: A=	COEFFICIENTS	2 2 2
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03	-			_		-		_	-		-	25	_	9	D		2	1
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			889	839						27				D O	_	30251		_
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					34.0	33 399	321	361	37.7	45	_			0	Þ	730151		
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 		31/2								œ			0.0	0	C		००१	
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		-	1010	817	12/2					21			-		0		200	
-		 	12/2	13/	31/39					27			0.0	0	D		200	_
		-	1-8	12/2/	12					21			-		_		004	_
		-	32.5		9-					27				A O		730231	-	
					53/	5257	10	207	43	35					0	-	<u> </u>	۲.
					12 T	- 8	469		489	45		75	-1.5	0	A	730151	100	B73 C
-		4.96	1.96	1.46	1.2	1.1	1.0	.9	.6	RUNS		φς	io	ß	Ω	CONFIGURALION	FIER	IDENTIFIER
					ı					а	•							C

α or β	COFFETCIENTS:		_						034	033 71	032	031	0.60		028	027	026	025	024	023 7	022	4		LUENTIFIER
8: A = -6 +66 by As = 20	X/L ICP	13							*	0151	Y			730251						30151	0	30251		CONFIGURATION
by 00= 2"	-	19							0	P	0	<u> </u>	0	D	0	D	0	D	0	D	0	0	Q	
= 2°									A	0	D		Z.	0	A	0	D	0	D	0	C	0	ū	3
B=-c	F	25		ļ	-	-			-	-	+	-1.5	-			0.0	•	-		is		0.0	8	Jo
† * <u>+</u>	ł }			_		_	-	_	•	75			+	<u> </u>	-		_	135	*	-	-	90	ø	
0,2.6	ł ł	31								-			-	-	 						-	-		
C=		63							7	٦	21	27	21	27	35	45	35	45	35	45	6	8	RUNS	10
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		}	\dashv	-	-	-	_	-	_		22.2	30,00	<u>c/</u>	118									1.96	
		61	\dashv	\dashv	\dashv	\dashv	_	4	\downarrow														4.96	
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VQV	03	75 76		\perp				$oldsymbol{\perp}$																

10

PRETEST

TABLE IV

DIMENSIONAL DATA

MODEL COMPONENT: BODY - B1			
GENERAL DESCRIPTION: Basic	n housing.	dy including	Canopy
DRAWING NUMBER:	THEORE	<u> </u>	ACTUAL MEASURED
DIMENSIONS:	FULL-SCALE	MODEL SCALE	MODEL SCALE
Length	1315 in.	5.260 in.	-
Max. Width (P.L. Bay/ Base)	208/20ih.	.832/.880in-	
Max. Depth	235in.	.940in.	*
Fineness Ratio	6.32	6.32	
Area			
Max. Cross-Sectional	47.4		
Planform	-		
Wetted	6250 f1.2	14.401.3	**************************************
Base Projected	317.7 ft.2	732 in.2	

TABLE IV (CONTINUED)

MODEL COMPONENT:			
GENERAL DESCRIPTION: Double De	elta Wina		
	7		
			
		•	
DRAWING NUMBER:			
DIMENSIONS:	MIDADESTA A	•	
DITEROSONO.	THEORETICA	<u>r</u> <u>v</u>	TUAL MEASURED
TOTAL DATA	FULL-SCALE	MODEL SCALE	MODEL SCALE
Area		(.004)	10000 00100
Planform Basic/Glove	3420/1197 ft.3	m 64 . /a ann. 2	
Wetted Base/Glove	492 819 F1.2</td <td>7.830/2.7351n.2 11.35/1.89 1h.3</td> <td></td>	7.830/2.7351n.2 11.35/1.89 1h.3	
Span (equivalent)	1115 in.	4.460 in.	
Aspect Ratio Basic/Glove	2.5/1.9	25/1.9	
Rate of Taper		***	
Taper Ratio Besic/Glove	0.0010-10	0.20/2.10	
Diehedral Angle, degrees Incidence Angle, degrees	73	7.	
Aerodynamic Twist, degrees		1.5.	
Toe-In Angle			
Cant Angle		•	
Sweep Back Angles, degrees			
Leading Edge Basis/Glove	35 / 753	350/753	
Trailing Edge	-19-60	-19-6.	
0.25 Element Line Chords:			
Root (Wing Sta. 0.0)&/G-	736/720 in.	2.944/2.880 p.	
Tip, (equivalent)	107 in.	D.583.	,
MAC Basic	507 in.	2.02210-	
Fus. Sta. of .25 MAC	***	_	
W.P. of .25 MAC			
B.L. of .25 MAC Airfoil Section	- 217in-	0.868 in-	
Root	0008-64		
Tip	0008-64	<u> </u>	
EXPOSED DATA	0008-04	0008-64	
Anna C	10,000/		
Area Basic/Glove Span, (equivalent)	1218.95/16255ft.2	2.806/0.3741-	
Aspect Ratio	453-51h.	1.814 in-	
Taper Ratio			
Chords			
Root Basic, Giove	626.87/404.74in.	2.507/1.619 in.	
Tip	14712	0-588 in-	
MAC Fire See of 25 MAC			
Fus. Sta. of .25 MAC W.P. of .25 MAC	-		
B.L. of .25 MAC			
	-		· <u> </u>

TABLE IV (CONTINUED)

MODEL COMPONENT: V11			· · · · · · · · · · · · · · · · · · ·
CENEDAL DESCRIPTION	1 4.1. /8.	•	
GENERAL DESCRIPTION: Twin vertic	RI TRITS DI	mensions !	are for a
single panel.	·		
		<u> </u>	
			·
			
DRAWING NUMBER:			
outraine noticent			
DIMENSIONS:	THEORETICAL	<u>L</u> ·	ACTUAL MEASURED
TOTAL DATA	FULL-SCALE	MODEL SCALE	MODEL SCALE
Area		(004)	
Planform	٠	_	
Wetted	525 F1.2	1.21 in.2	
Span (equivalent)			
Aspect Ratio		-	
Rate of Taper			
Taper Ratio			
Diehedral Angle, degrees	750	75°	
Incidence Angle, degrees	υ°		
Aerodynamic Twist, degrees	o°	03	
Toe-In Angle	<u>0 °</u>		
Cant Angle	150	15°	
Sweep Back Angles, degrees	45*	150	
Leading Edge	- 20°		
Trailing Edge 0.25 Element Line		203	
Chords:			
Root (Wing Sta. 0.0)	_	_	
Tip, (equivalent)	-		
MAC	***		*
Fus. Sta. of .25 MAC	-		:
W.P. of .25 MAC	•		
B.L. of .25 MAC	•	**	
Airfoil Section	- \		· · · · · · · · · · · · · · · · · · ·
Root	5 wedge 60/40)	5 wester (60/40)
Tip	5° vedic (60/40)	5 wedge (60/40)
EXPOSED DATA		3	,
	250F12	200 63	
Area		250 F4.2	
Span, (equivalent) Aspect Ratio		<u> </u>	
Taper Ratio	035	0.35	
Chords		0.33	•
Root	230 in	0.970 in	
Tip .	2 Din.	0.320	
MAC			
Fus. Sta. of .25 MAC			
W.P. of .25 MAC			
B.L. of .25 MAC	-	•	

TABLE IV (CONTINUED)

MODEL COMPONENT: BODY - A1			
GENERAL DESCRIPTION: About	SRM pods.	Cone cylind	ers with a
72.5° half angle nose co	ne. Rocket	nozzle is a	22.53
cone. Nose rudius is . 5:			
scale			
_			
DRAWING NUMBER:			•
	THEORE	FICAL	ACTUAL MEASURED
<u>DIMENSIONS</u> :	FULL-SCALE	MODEL SCALE	MODEL SCALE
Length	347 in.	1.368 in	
Max. Width	<u>62 in.</u>	.248 in.	***************************************
Max. Depth			-
Fineness Ratio	5.52	5.52	
Area			
Max. Cross-Sectional	22.3f+.2	.0515 in.2	
Planform	-		
Wetted			
Paco	-	_	

MODEL COMPONENT: BO	ODY - T1		
GENERAL DESCRIPTION:	Hydrogen-Oxygen	(HO) Tank With 220 N	osecone.
			·
			·
DRAWING NUMBER			
DIMENSION:		FULL SCALE	MODEL SCALE
Length		1876.75 in.	7.507 in.
Max Width		346 in.	1.384 in.
Max Depth	• •	346 in.	1.384 in.
Fineness Ratio		5. 42	5.42
Area			
Max Cross-Sec	tional	652.95 ft. ²	1.504 in. ²
Planform	•		-
Wetted		_	
Base		652.95 ft. ²	1.504 in. ²

MODEL COMPONENT: BO	DDY - T3		
GENERAL DESCRIPTION:	Hydrogen-Oxygen (1	HO) Tank With 17°	Nosecone.
· · · · · · · · · · · · · · · · · · ·			
DRAWING NUMBER			
DIMENSION:		FULL SCALE	MODEL SCALE
Length		2031.75 in.	8.127 in.
Max Width	•	346 in.	1.384 in.
Max Depth		346 in.	1.384 in.
Fineness Ratio		5.87	5.87
Area		(50.05.01.2	2
Max Cross-Sect	tional	652.95 ft. ²	1.504 in. ²
Planform		-	
Wetted		_	
Base		652.95 ft. ²	1.504 in. ²

TABLE IV (CONCLUDED)

MODEL COMPONENT: BODY - S1			
GENERAL DESCRIPTION: SOLID	ROCKET MO	TO?	
DRAWING NUMBER:			
	THEORET	CICAL	ACTUAL MEASURED
DIMENSIONS:	FULL-SCALE	MODEL SCALE	MODEL SCALE
Length	1743 in.	6.972 in.	
Max. Width	156 in-	0.624 in.	
Max. Depth	156 in.	0.624 in.	
Fineness Ratio	<u> 11.17</u>	11-17	
Area			
Max. Cross-Sectional	132-5 Ft.2	0.306in.2	
Planform			
Wetted		-	·
Base	132.5 Ft.2	0 30/16.7	

TABLE V.

INDEX OF MODEL FIGURES

FIGURE	DESCRIPTION	PAGE
1	Baseline Launch Vehicle	23
2	General Arrangement, Space Shuttle 049 Orbiter	24
3	156-Inch Solid Rocket Motor	25
4	346-Inch Diameter HO Tank With 17 Degree Nosecone	26
5	Static Pressure Tap Positions	27
6	Typical MSFC 14 x 14-Inch Tunnel Installation For Pressure Testing of 049 Orbiter in Launch Configuration	28

TABLE VI. ... INDEX OF DATA FIGURES

### ##################################	TITLE T301S1 Fuselage Pressures T301S1 Fuselage Pressures
-1.5 0.0 0.0 -1.5 -1.5 -1.5 -1.5 Pressures Pressures Pressures Pressures Pressures Pressures O.0 Pressures O.0 Pressures O.0 Pressures O.0 Pressures O.0 Pressures	
-1.5 -1.5 -1.5 Pressures Pressures Pressures -1.5 90 Pressures -1.5 90 CP vs.	
-1.5 -1.5 0.0 Pressures Pressures Pressures -1.5 90 Pressures -1.5 90 CP vs.	
Pressures Pressures Pressures Pressures Pressures Pressures O.O Pressures O.O Pressures O.O Pressures O.O Pressures O.O Pressures	
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Pressures 90 Pressures 0.0 CP vs.	
Pressures Pressures 0.0 Pressures 0.0 CP vs.	
Pressures O.O Pressures O.O CP vs.	······································
Pressures 0.0 Pressures -1.5 90 CP vs.	
0.0 CP vs.	
Pressures -1.5 90 CP vs.	
	T302S1 Fuselage Pressure

TABLE VI. (CONTINUED)

T101S1 Fuselage Pressures -1.5 75	TLOISI Fuselage Pressures 75	T302S1 Fuselage Pressures 135	-1.5	0.0	T302Sl Fuselage Pressures	T301S1 Fuselage Pressures	0.0	-1.5	135	90	T301S1 Fuselage Pressures -1.5	T302Sl Fuselage Pressures 0.0	0.0	-1.5		T302S1 Fuselage Pressures -1.5 90	TITLE VALUES to $\phi_{\rm s}$
CP vs. X/L								 					· · · · · · · · · · · · · · · · · · ·	 .		CP vs. X/L	LYPE
Beta	Alpha	Beta, Mn	Alpha, Mn	Beta, Mn	Alpha, Mn	Beta, Mn	Alpha, Mn	Beta, Mn	Alpha, Mn	Beta, Mn	Alpha, Mn	Beta, Mn	Alpha, Mn	Beta	Alpha	Beta, Mn	VARYING
210-211	208-209	202-207	196-201	190-195	184-189	174-183	164-173	154-163	144-153	134-143	124-133	123	121-122	120	119	113-118	PAGE

TABLE VI. (CONTINUED)

T302Sl Upper/Lower Wing Pressures -		T302Sl Upper/Lower Wing Pressures	T301S1 Upper/Lower Wing Pressures	The second of th		T30181 Upper/Lower Wing Pressures	T302Sl Upper/Lower Wing Pressures							T302Sl Upper/Lower Wing Pressures	T301S1 Upper/Lower Wing Pressures	T301S1 Upper/Lower Wing Pressures -:	T. T. T. T. T. C.
-1.5	0.0							•••	-1.5	-1.5	0.0	0.0	-1.5			-1.5	PARAMETER VALUES
% -				-%	75											75	が 数 語
CP vs. X/C							· · · · · · · · · · · · · · · · · · ·									CP vs. X/C	LAKL
Alpha, Y/B, Mn	Beta, Y/B, Mn	Alpha, Y/B, Mn	Beta, Y/B, Mn	Alpha, Y/B, Mn	Beta, Y/B, Mn	Alpha, Y/B, Mn	Beta, Y/B	Alpha, Y/B	Beta, Y/B	Alpha, Y/B	Beta, Y/B, Mn	Alpha, Y/B, Mn	Beta, Y/B, Mn	Alpha, Y/B, Mn	Beta, Y/B, Mn	Alpha, Y/B, Mn	CONDITIONS VARYING
518-535	500-517	482-499	452-481	422-451	392-421	362-391	356-361	350-355	347-349	344-346	326-343	308-325	290-307	272-289	242-271	212-241	PAGE

TABLE VI. (CONCLUDED)

830-835	Alpha, Y/B	CP vs. X/C	75	-1.5	TlO1Sl Upper/Lower Wing Pressures
824-829	Alpha, Y/B		75		TlO1S1 Upper/Lower Wing Pressures
806-823	Beta, Y/B, Mn		135		T302Sl Upper/Lower Wing Pressures
788-805	Alpha, Y/B, Mn			-1.5	
770-787	Beta, Y/B, Mn			0.0	
752-769	Alpha, Y/B, Mn				T302Sl Upper/Lower Wing Pressures
722-751	Beta, Y/B, Mn				T301S1 Upper/Lower Wing Pressures
692-721	Alpha, Y/B, Mn			- 0.	
662-691	Beta, Y/B, Mn			-1.5	
632-661	Alpha, Y/B, Mn		135		
602-631	Beta, Y/B, Mn		90		Mary and provided the second
572-601	Alpha, Y/B, Mn			-1.5	T301S1 Upper/Lower Wing Pressures
566-571	Beta, Y/B			0.0	T302Sl Upper/Lower Wing Pressures
560-565	Alpha, Y/B			0.0	
557-559	Beta, Y/B			-1.5	
554-556	Alpha, Y/B				
536-553	Beta, Y/B, Mn	CP vs. X/C	-90	-1.5	T302Sl Upper/Lower Wing Pressures
PAGE	CONDITIONS VARYING	TYYT	RAMETER VALUES $\phi_{\rm s}$	PARAMETER VALUES $\dot{ au}_{ m o}$	TTTLE

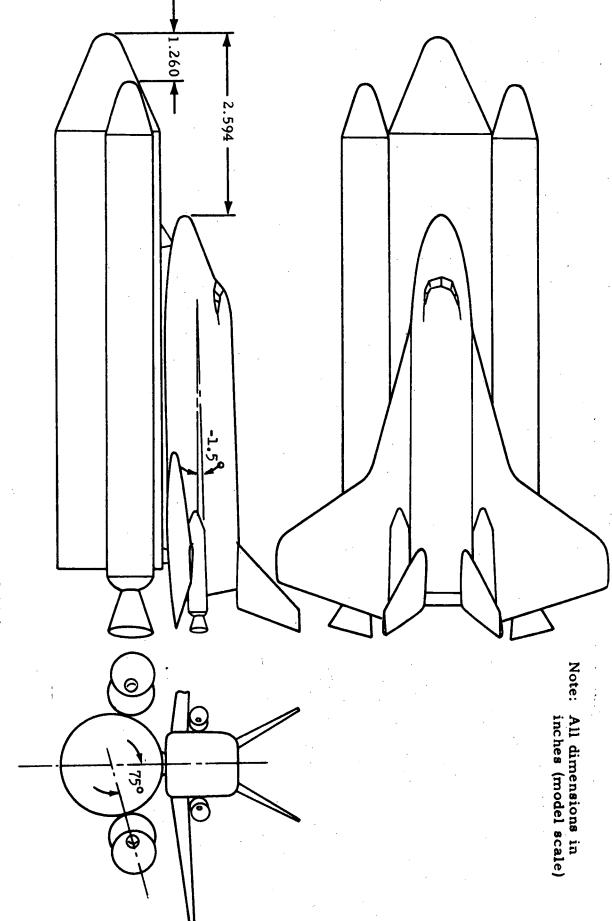


Fig. 1 - Baseline Launch Vehicle

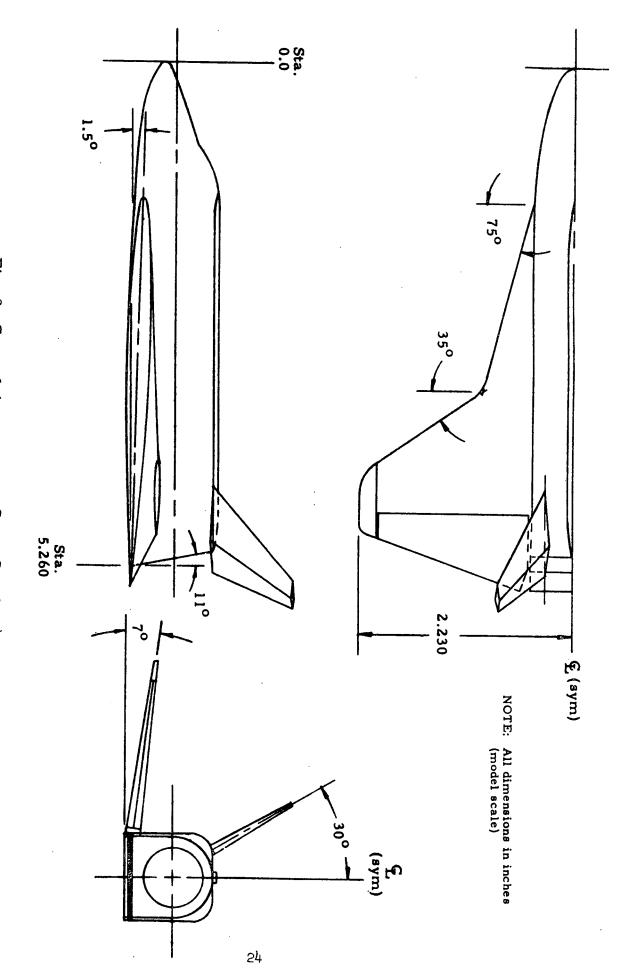
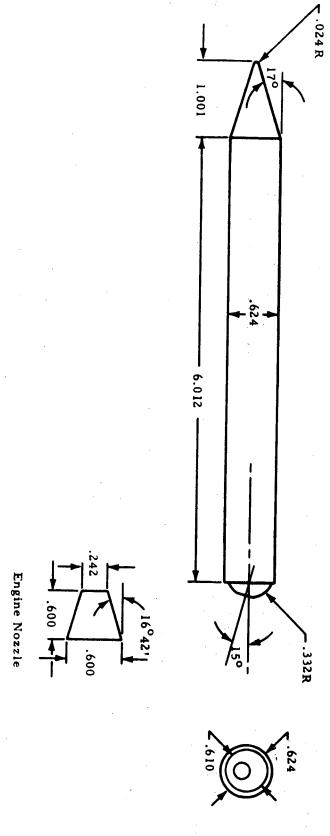


Fig. 2- General Arrangement, Space Shuttle 049 Orbiter

Note: All dimensions in inches (model scale)



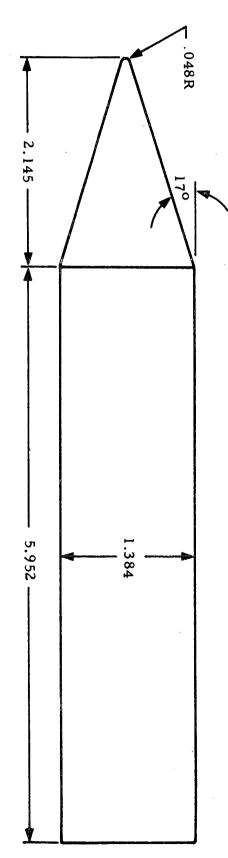


Fig. 4 - 346-Inch Diameter HO Tank with 17-Degree Nosecone

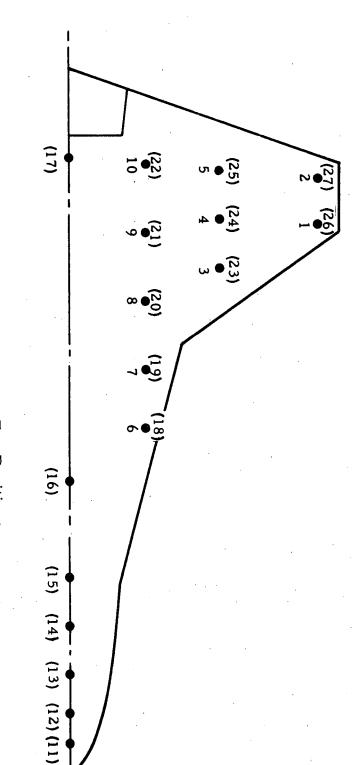


Fig. 5 - Static Pressure Tap Positions

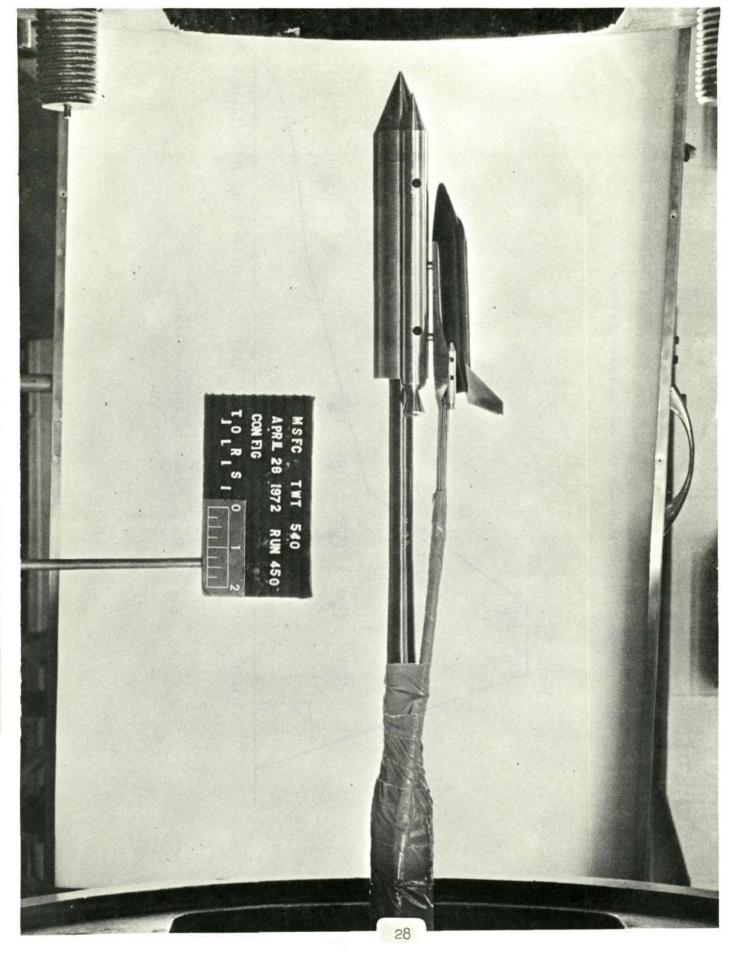
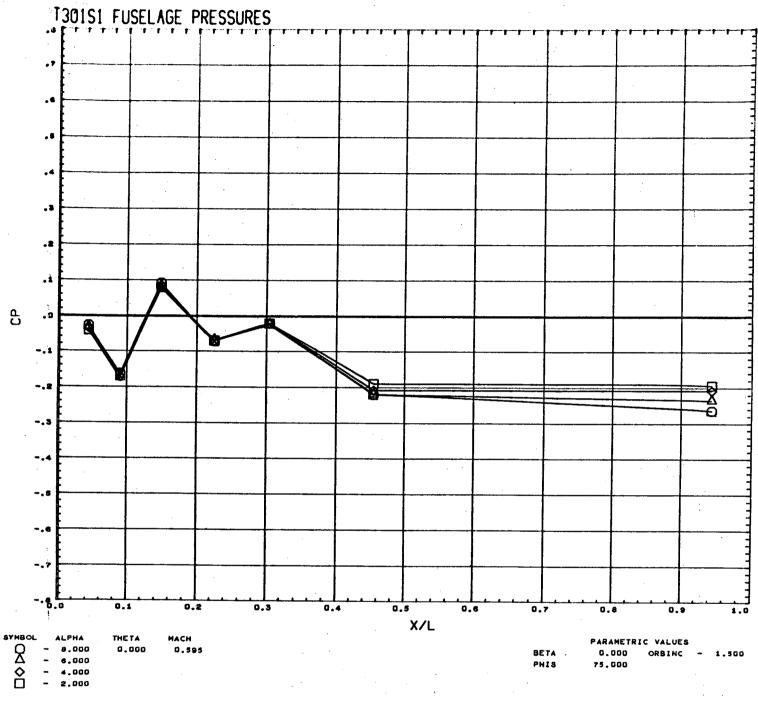


Figure 6. Typical MSFC 14x14-Inch Tunnel Installation for Pressure Testing of 049 Orbiter in the Launch Configuration

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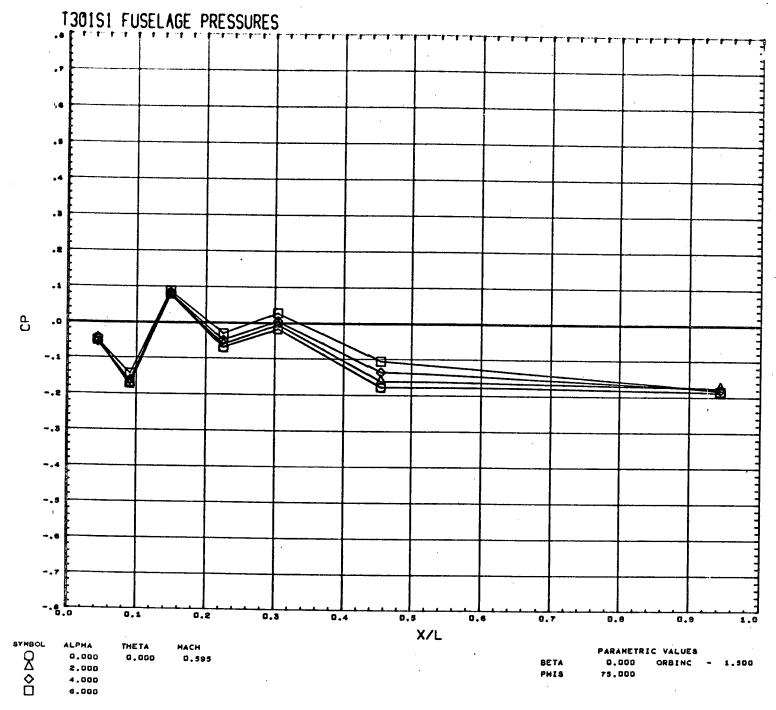


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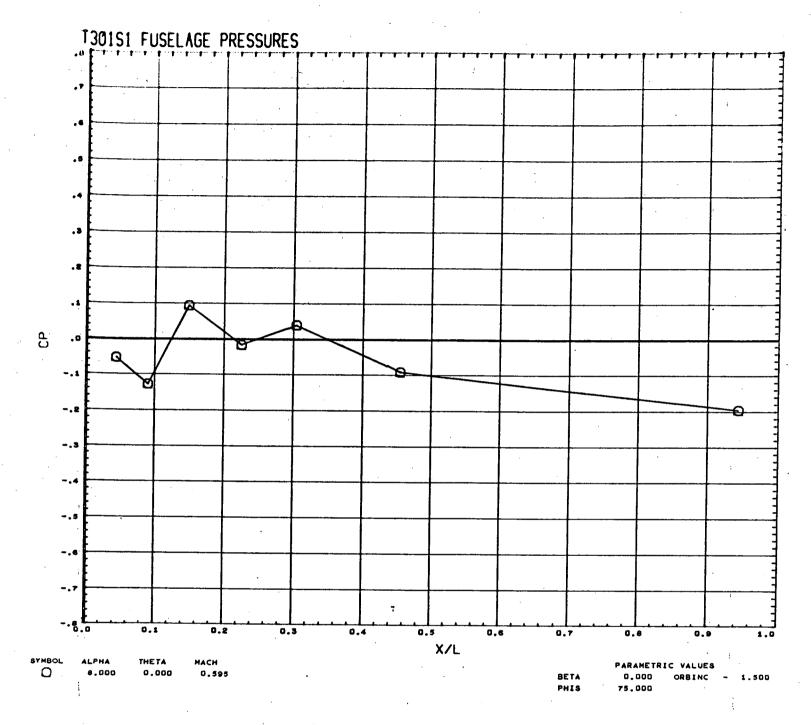
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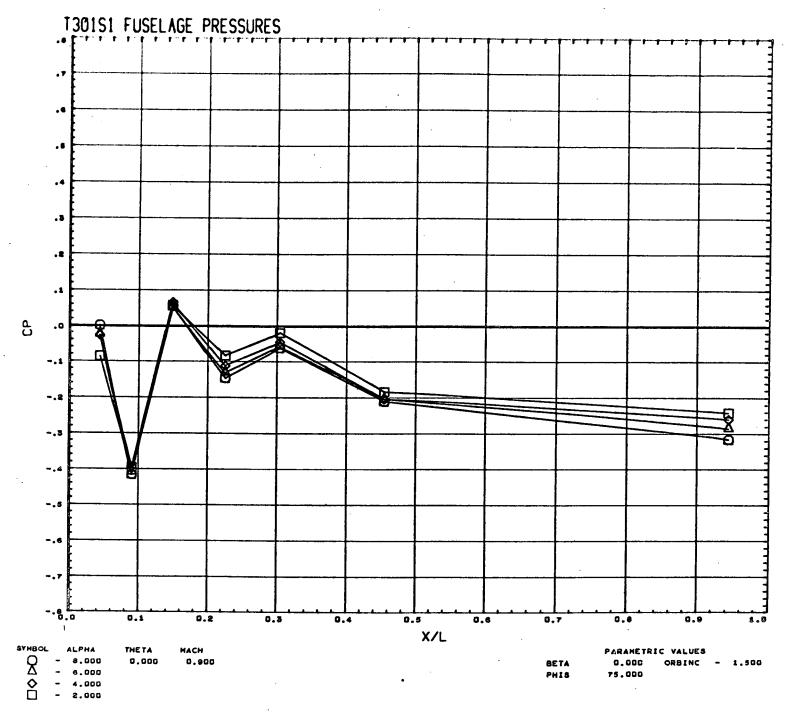


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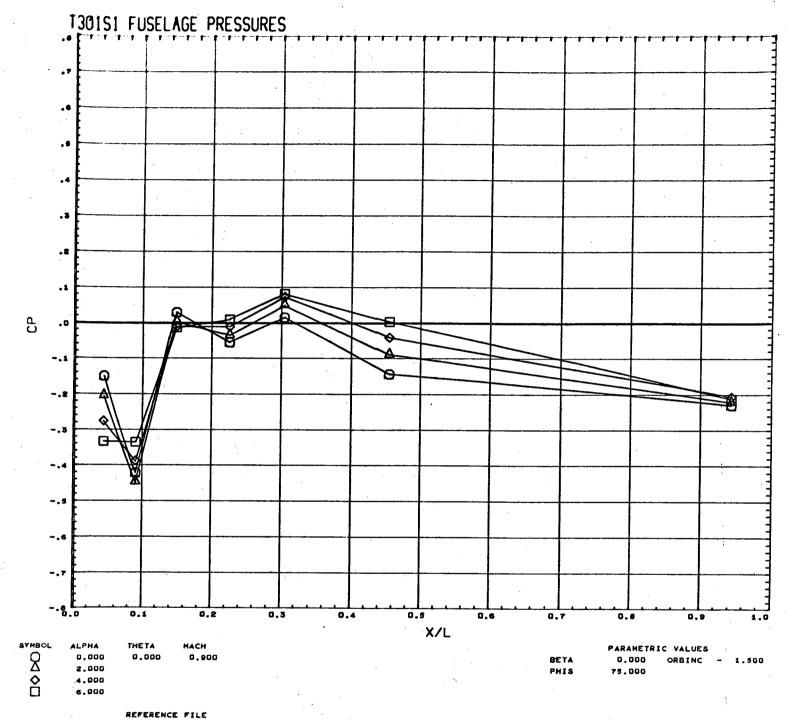
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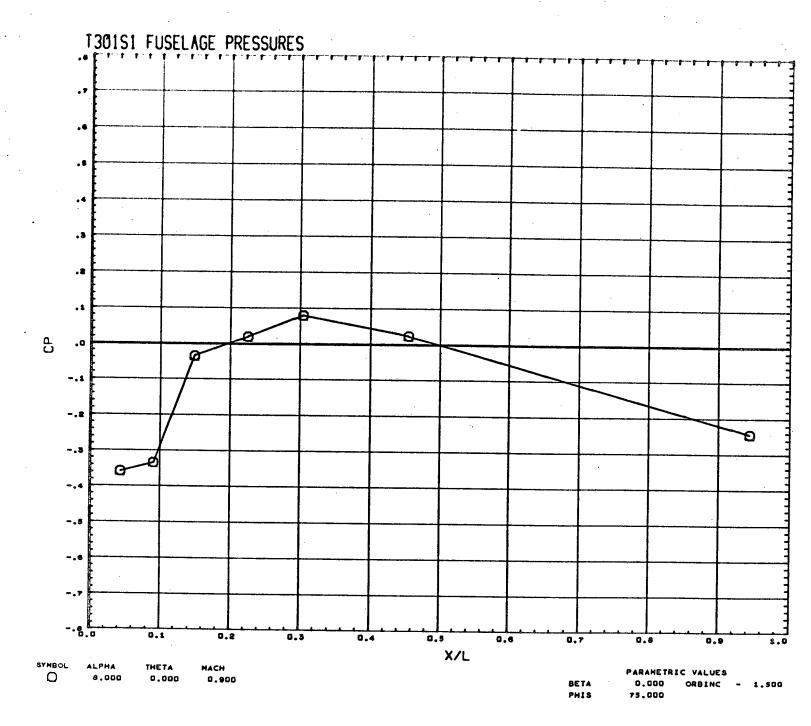


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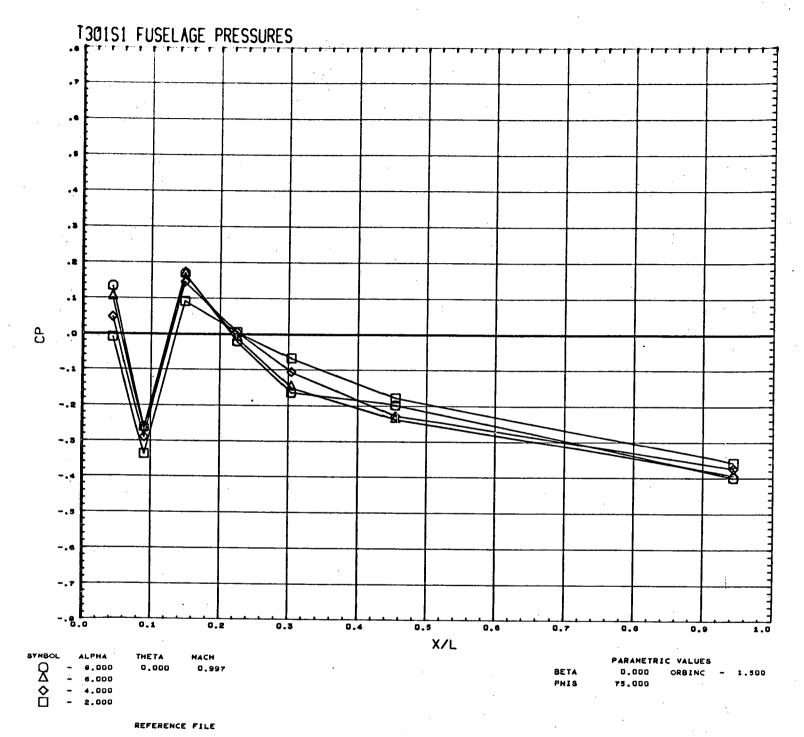


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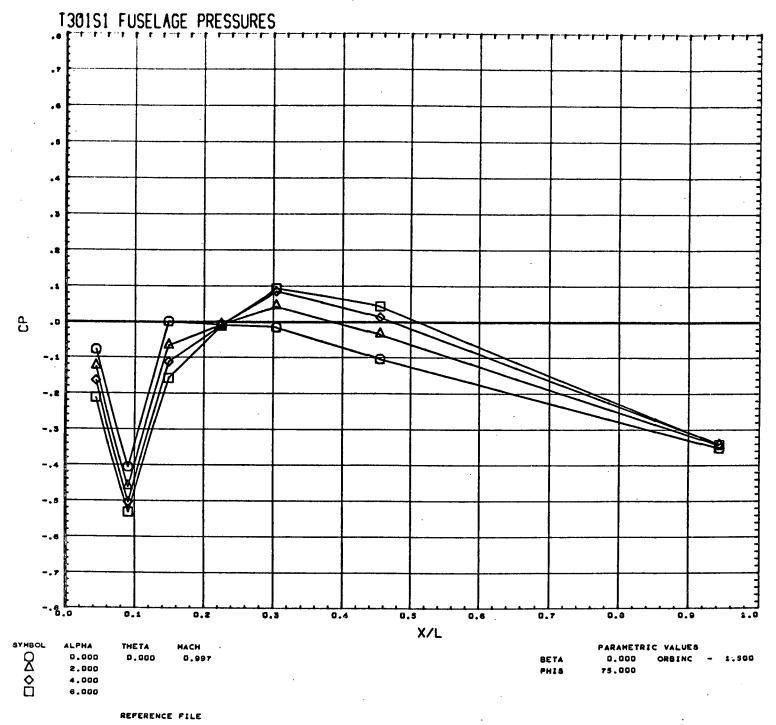


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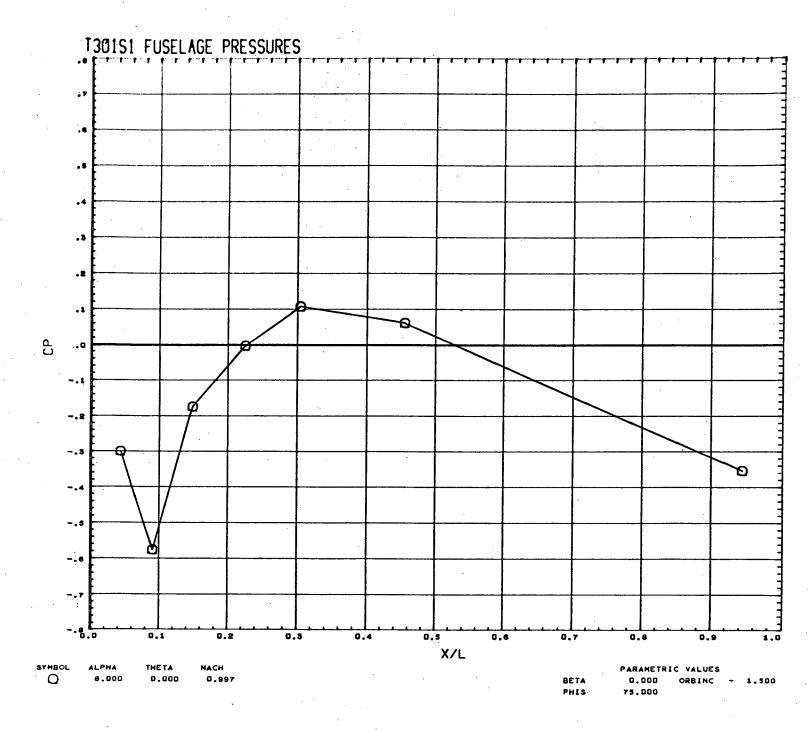
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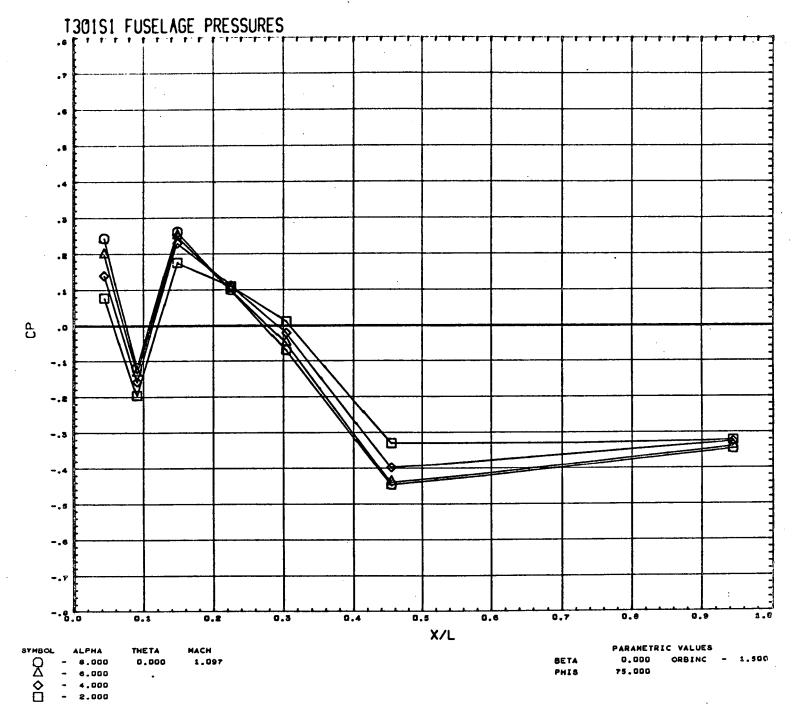


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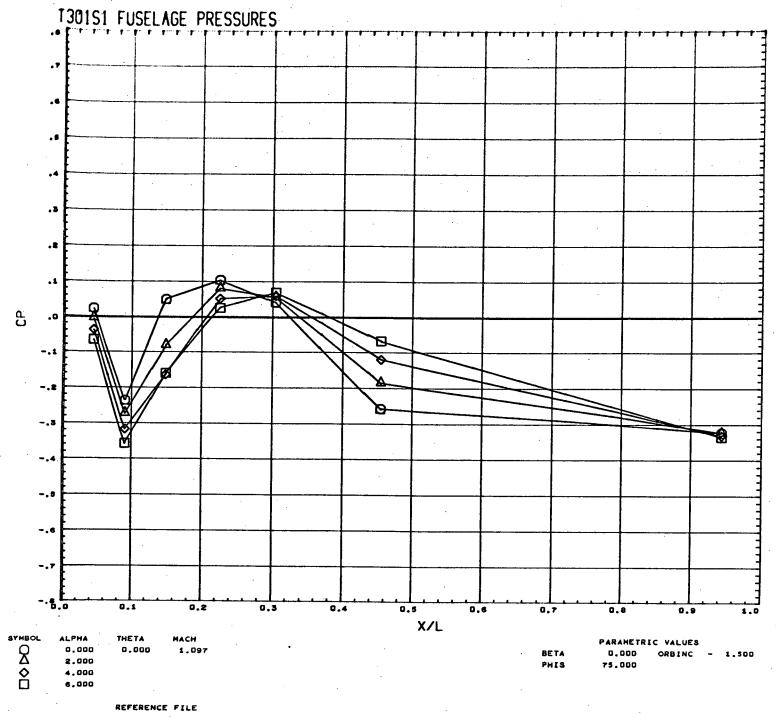
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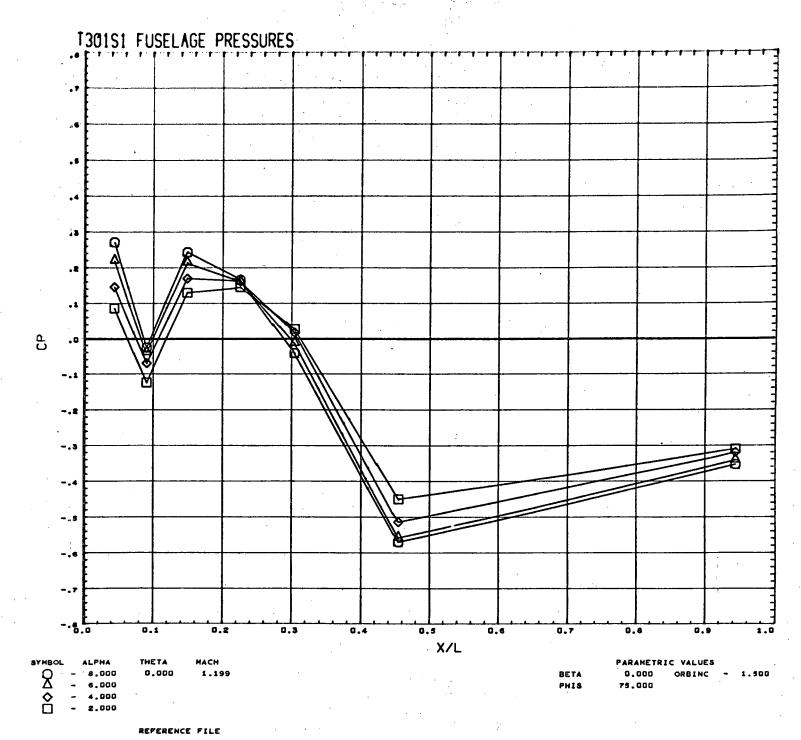
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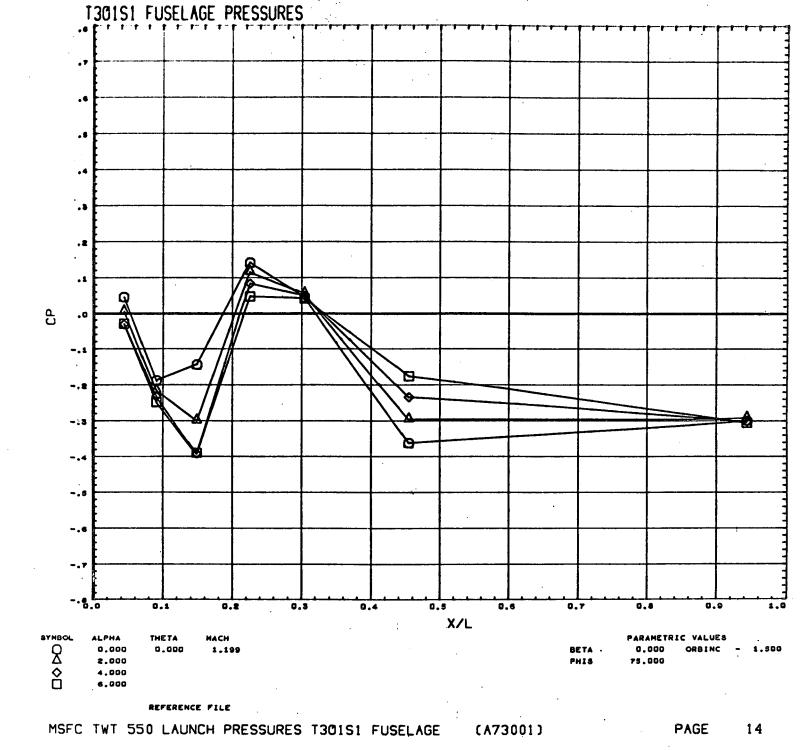


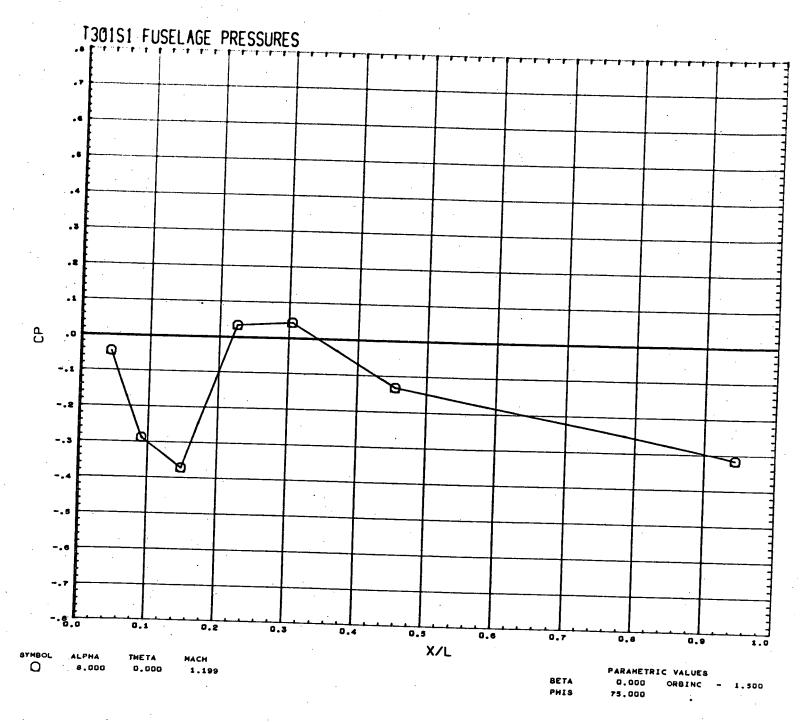
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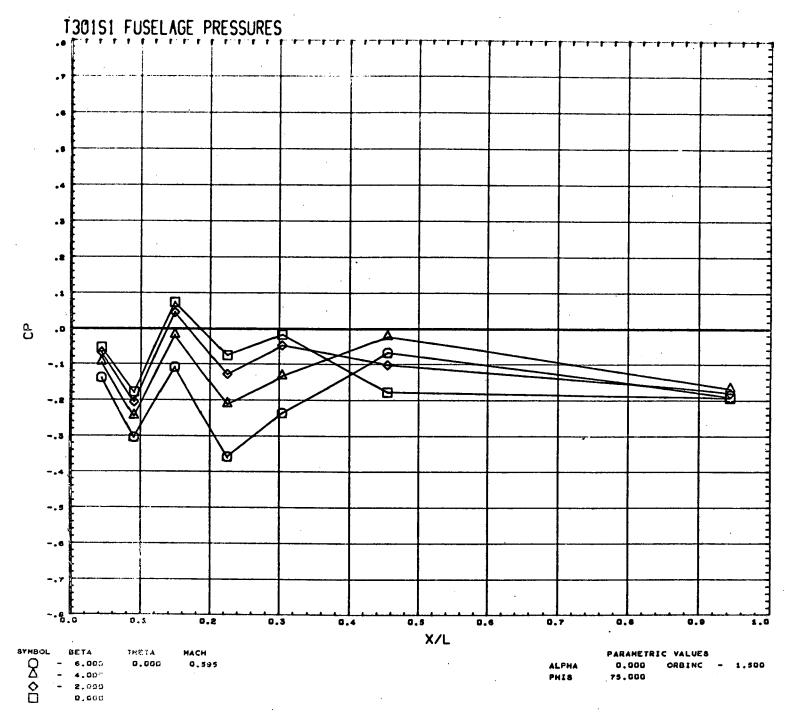
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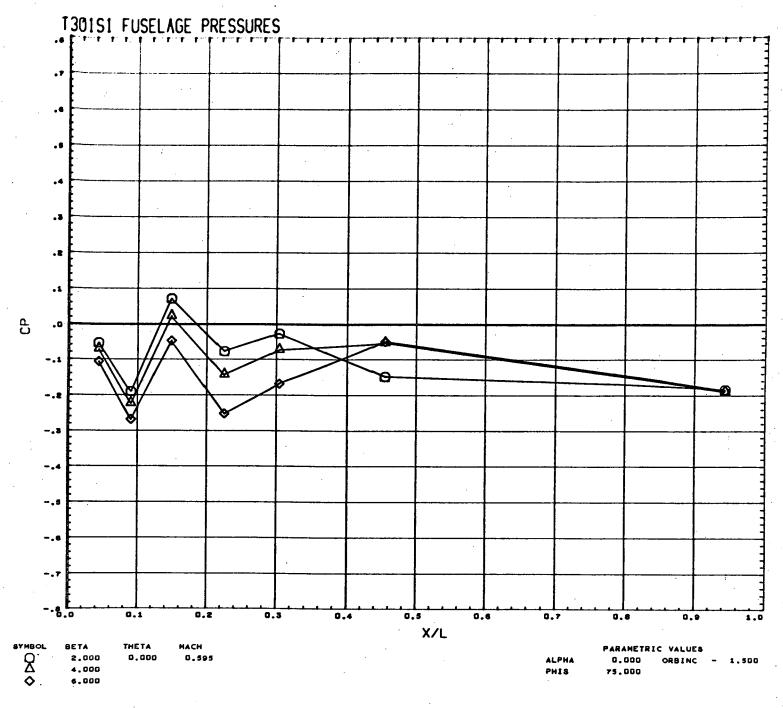
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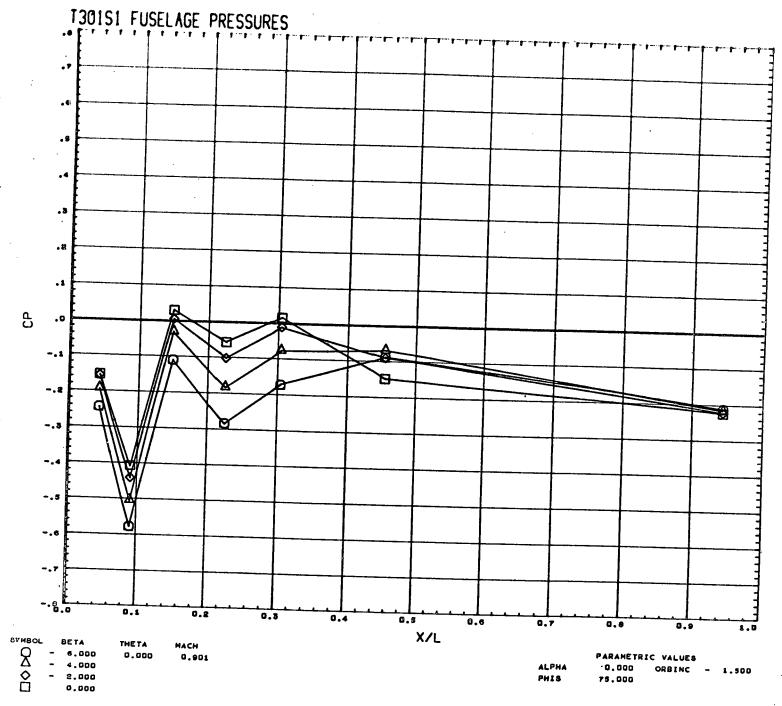
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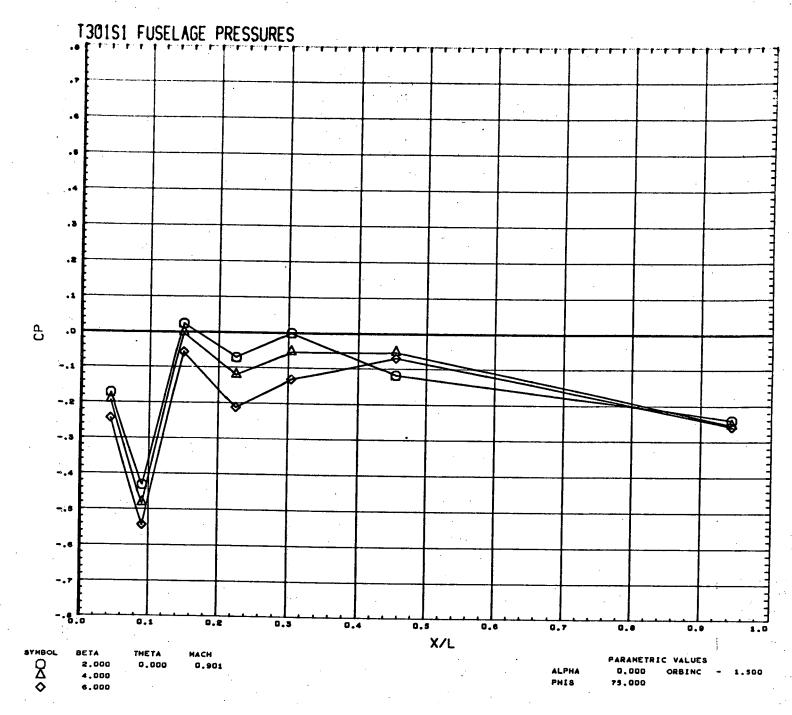
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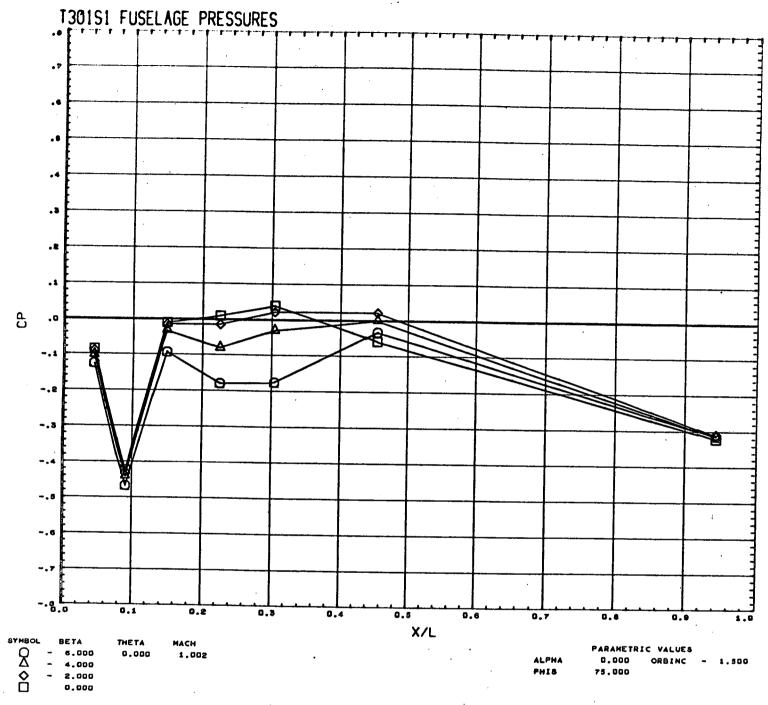
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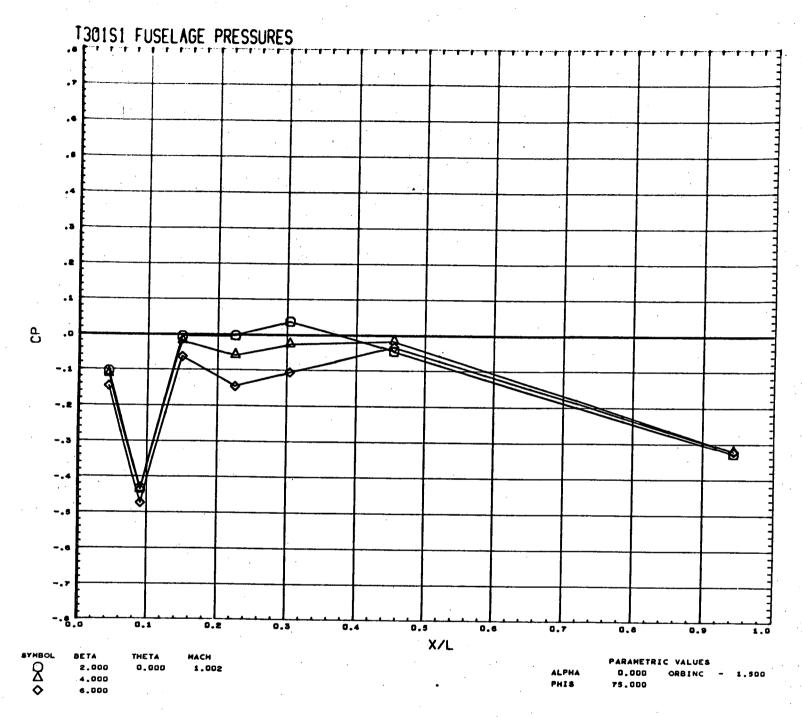
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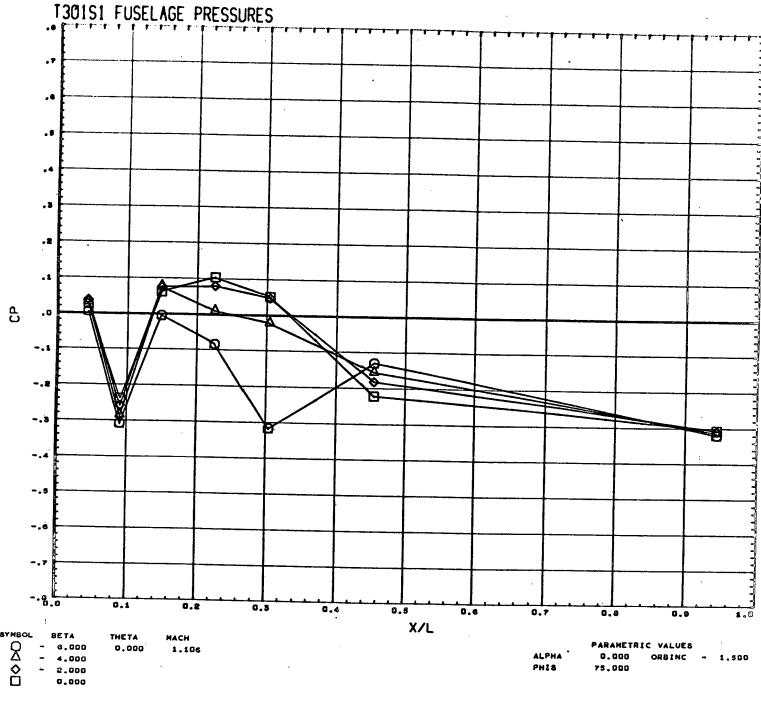
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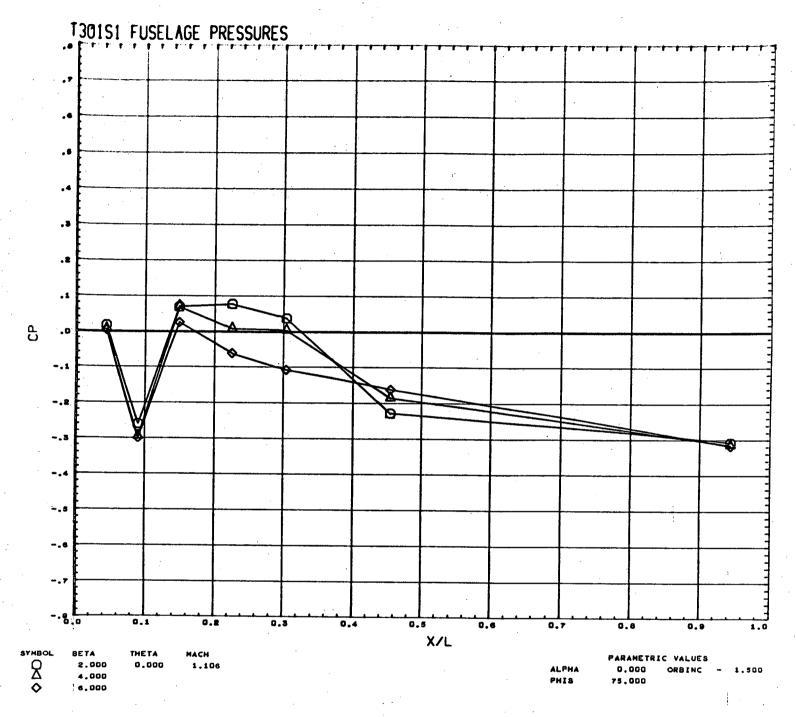
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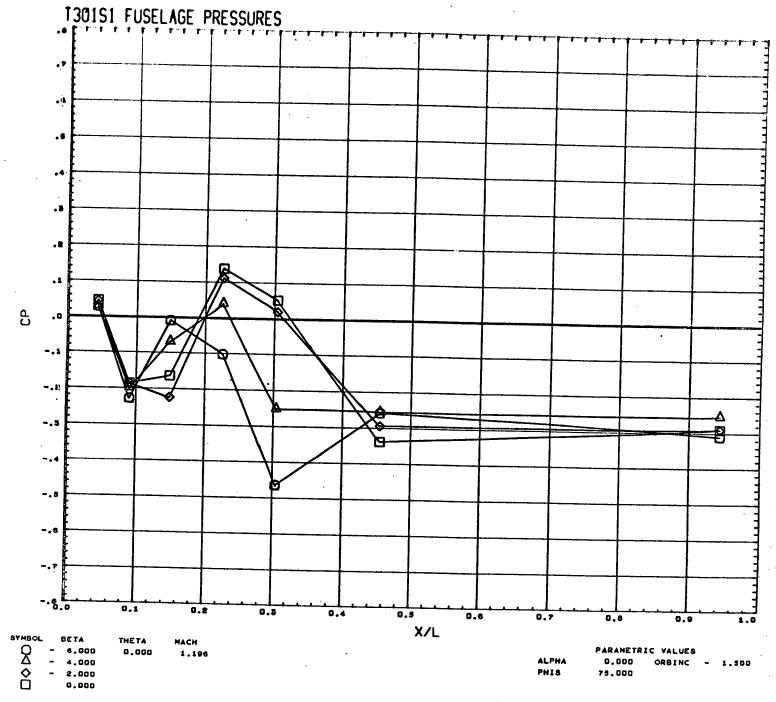


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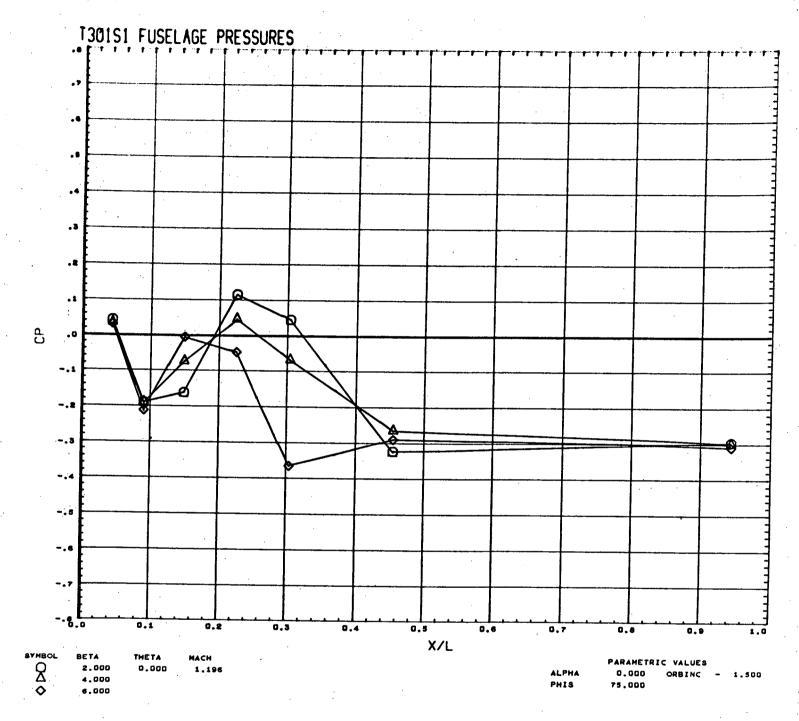
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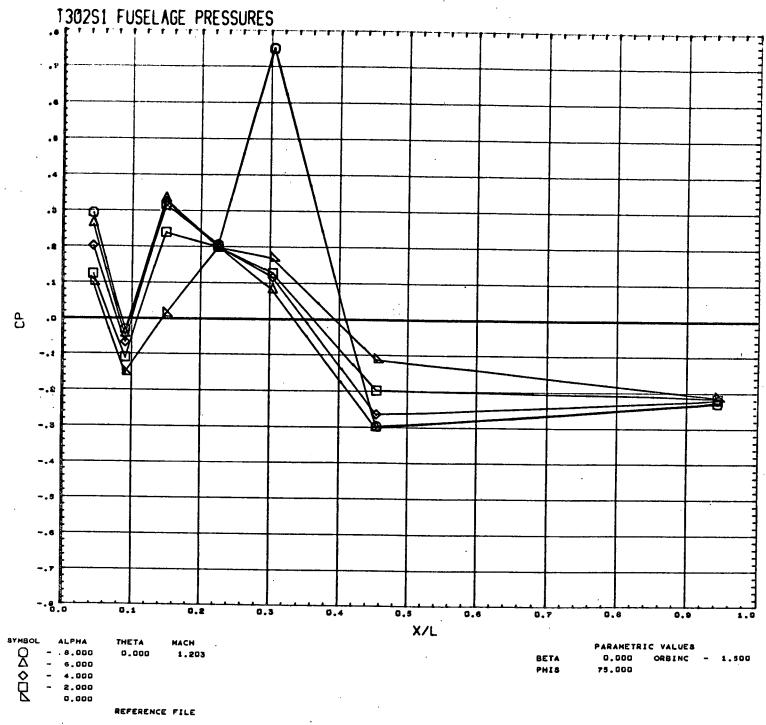
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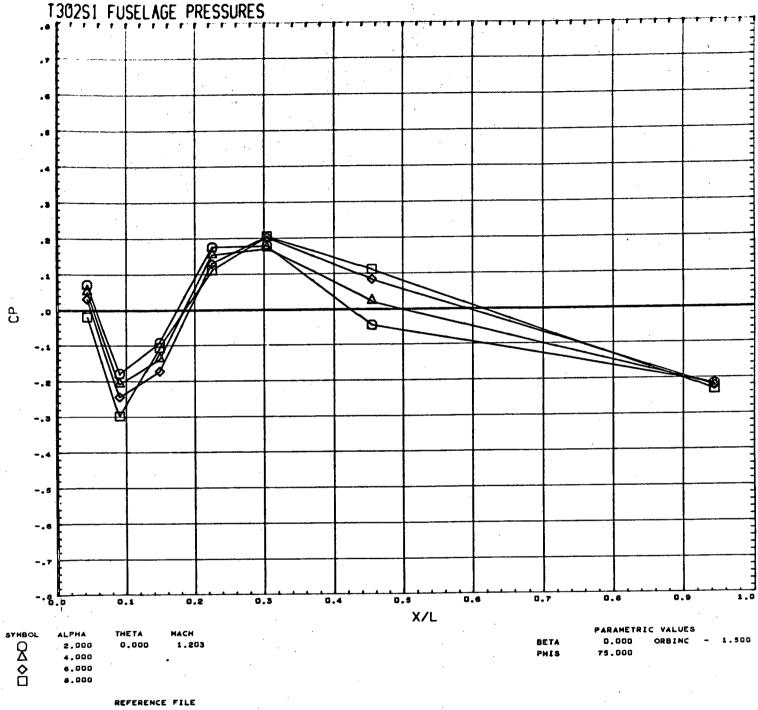


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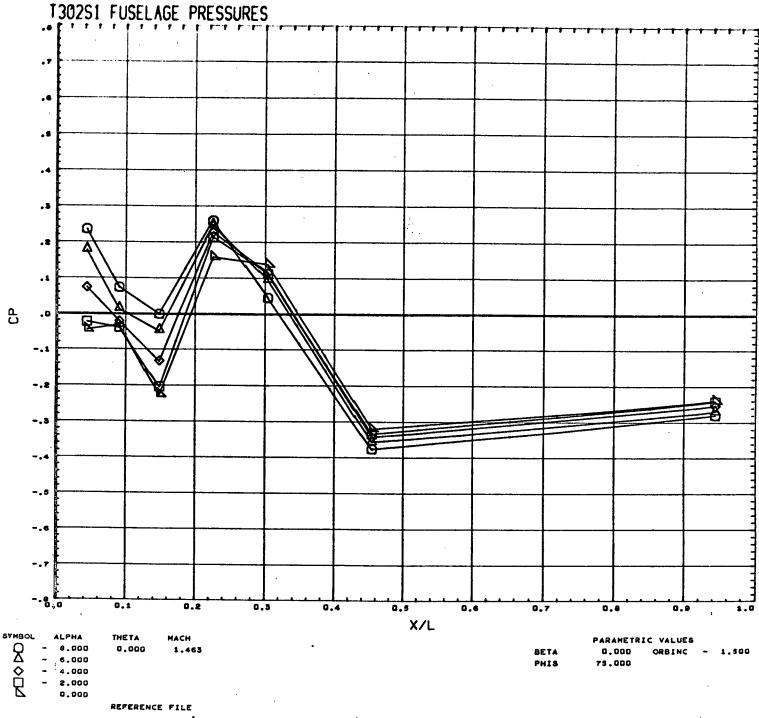


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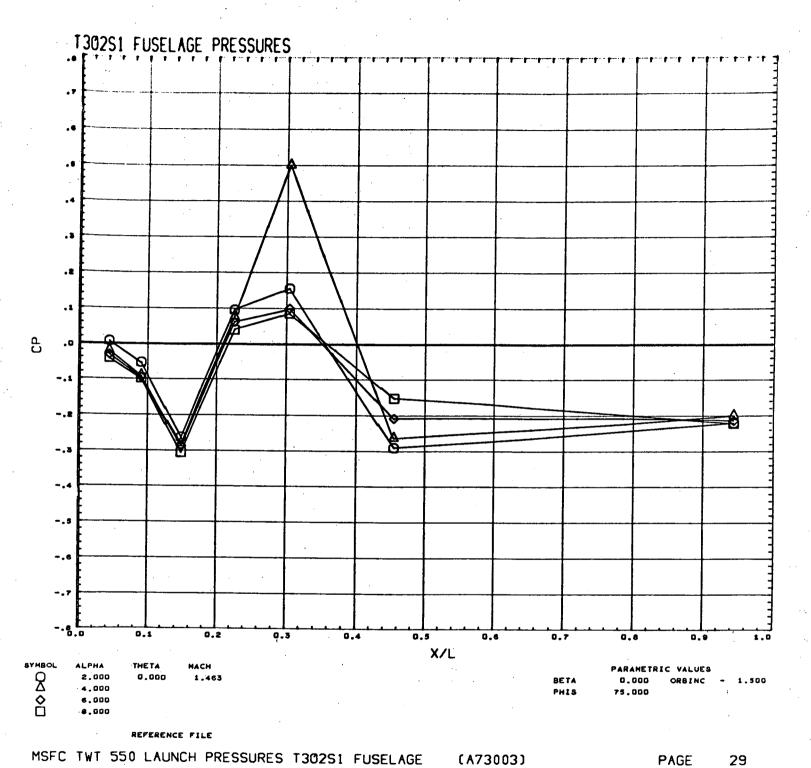


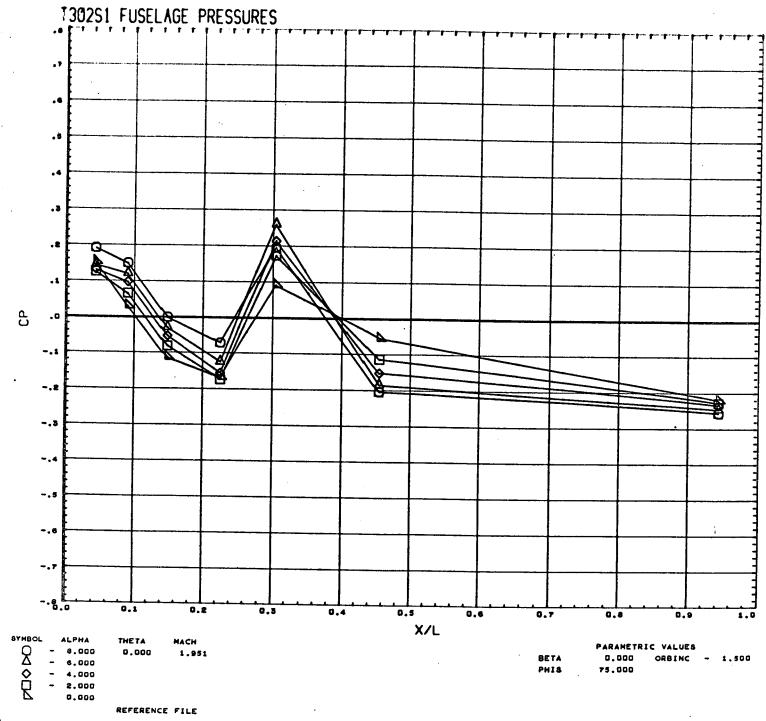
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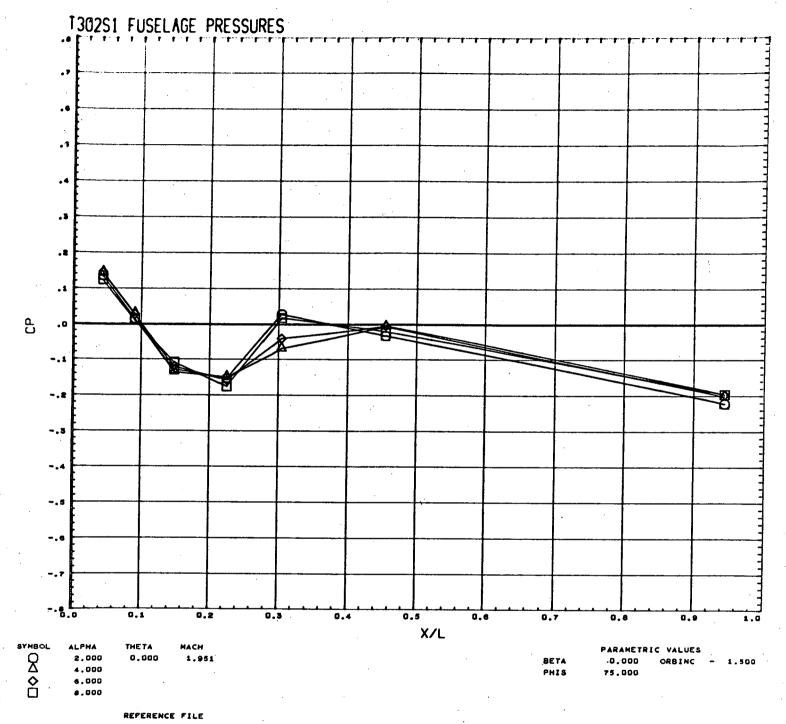


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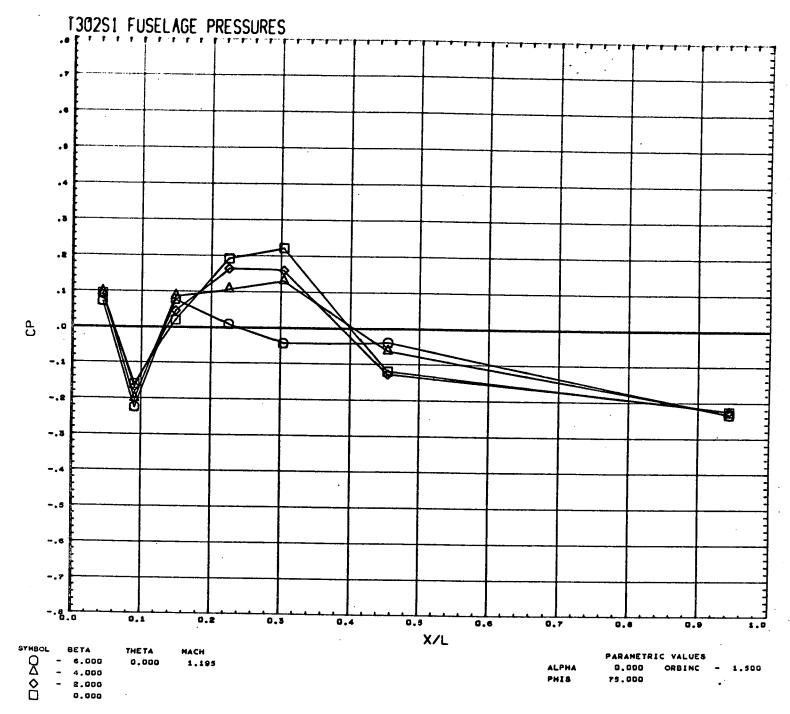




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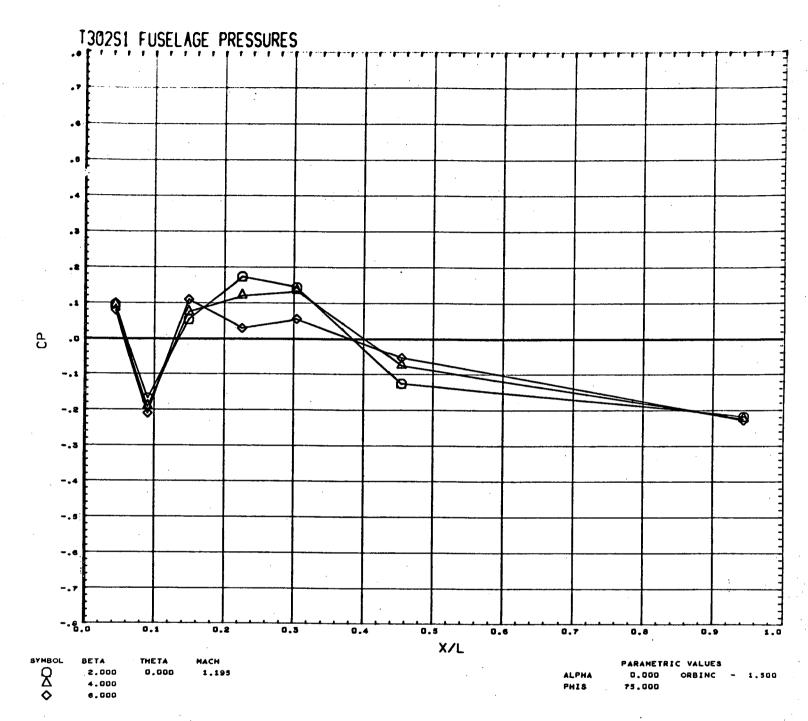


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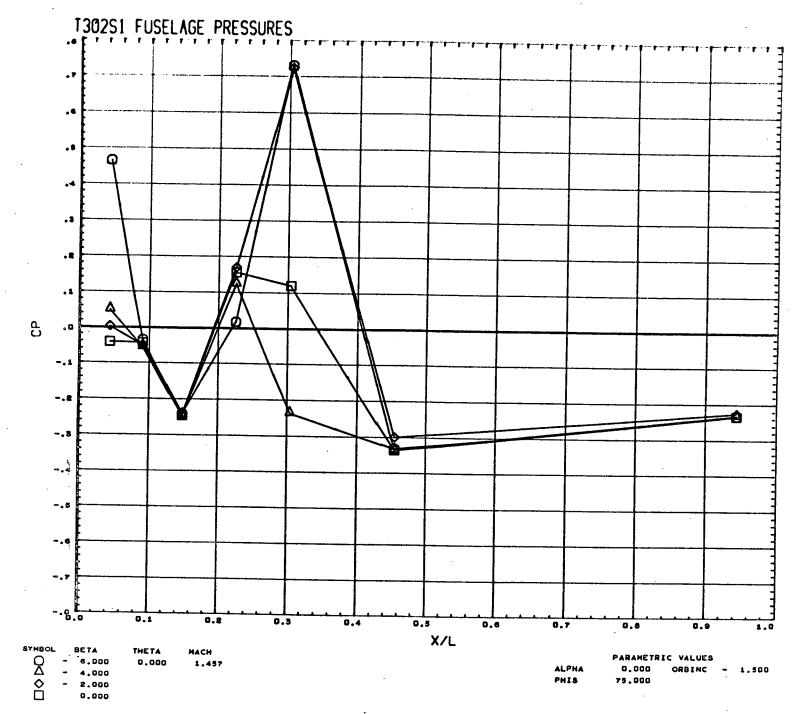
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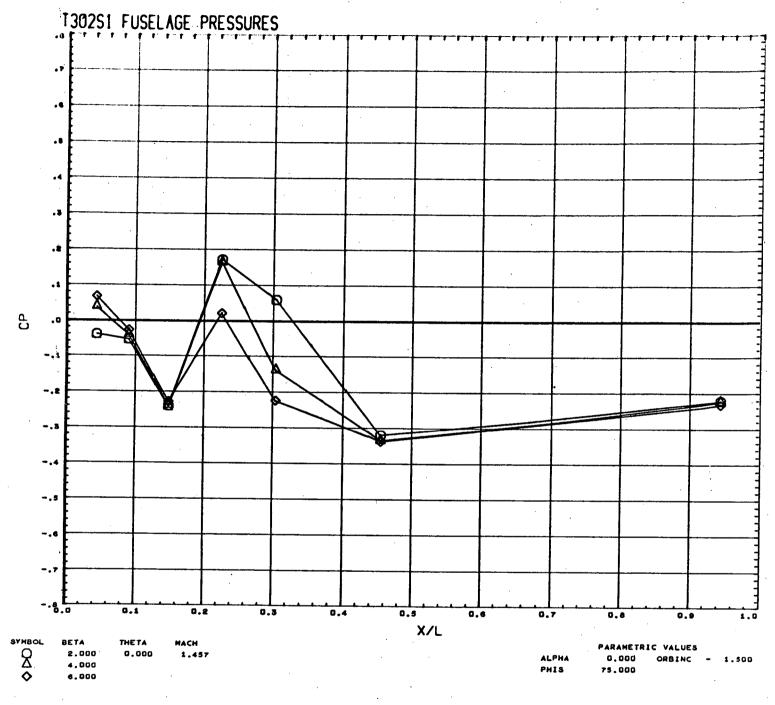
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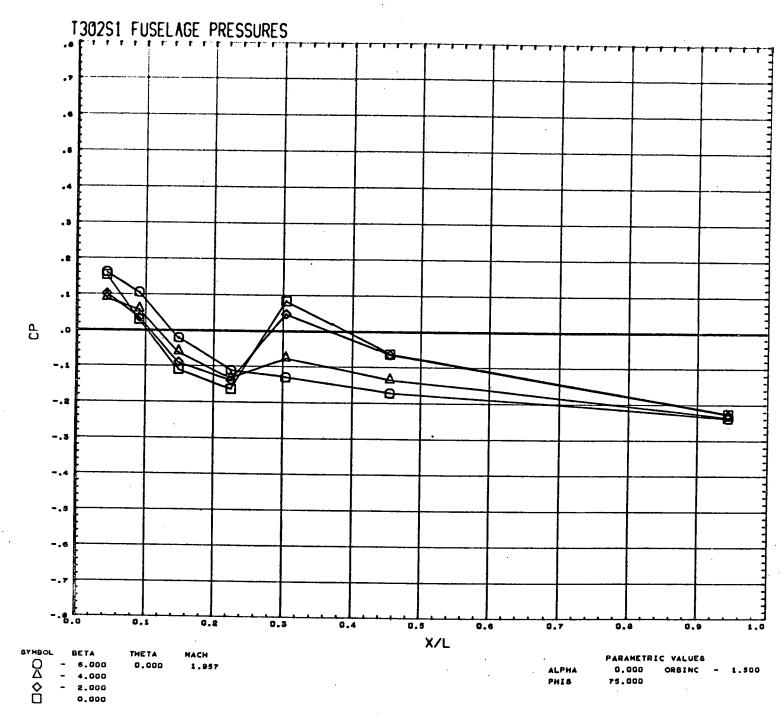
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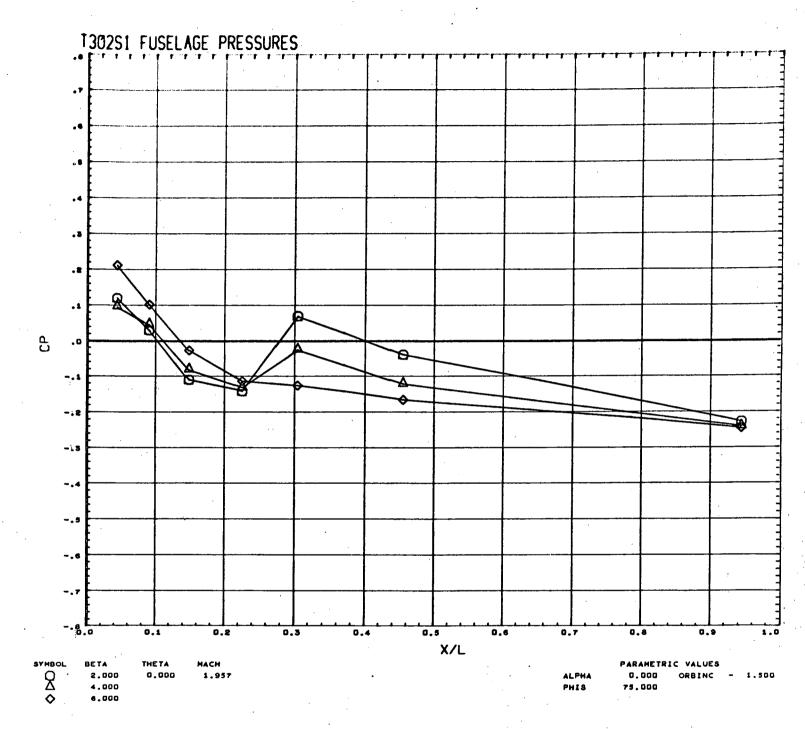
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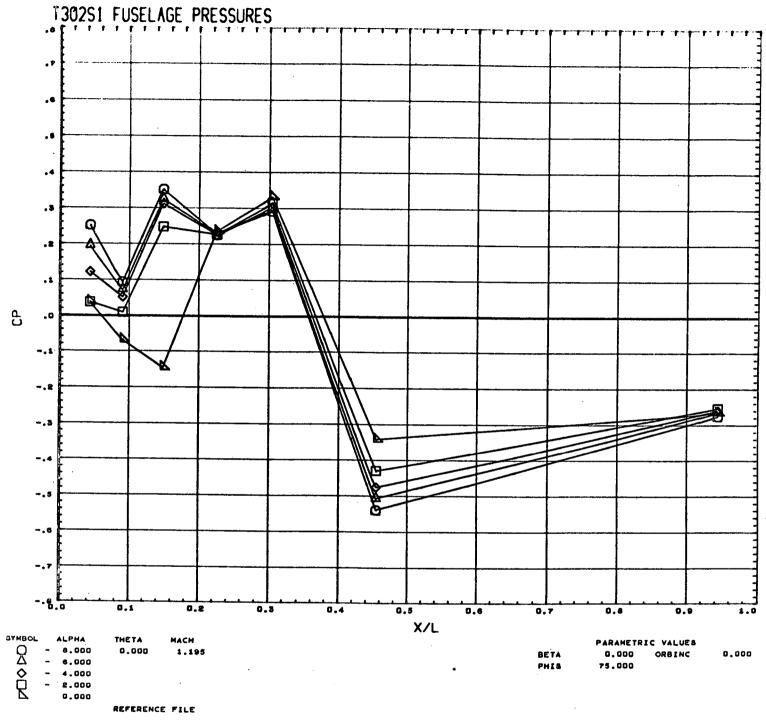


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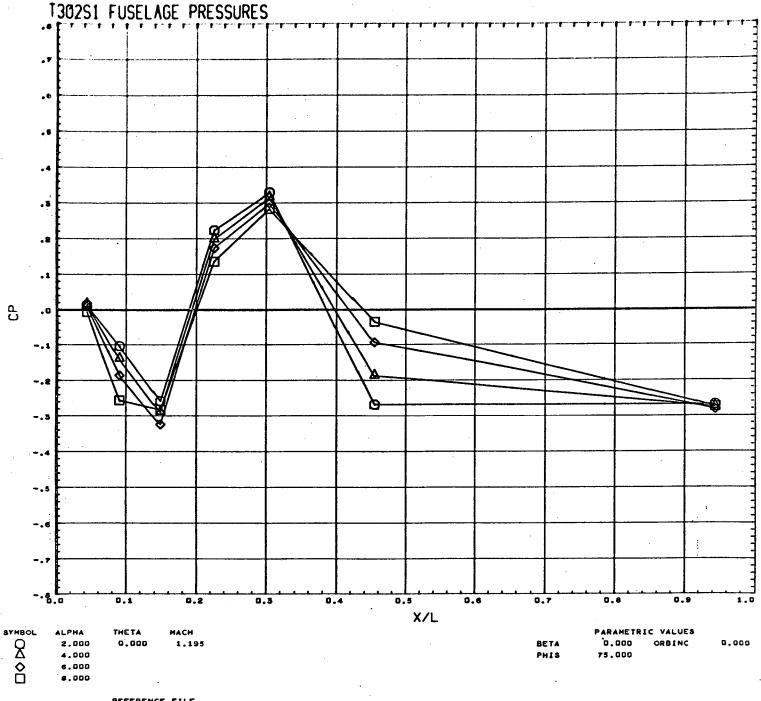
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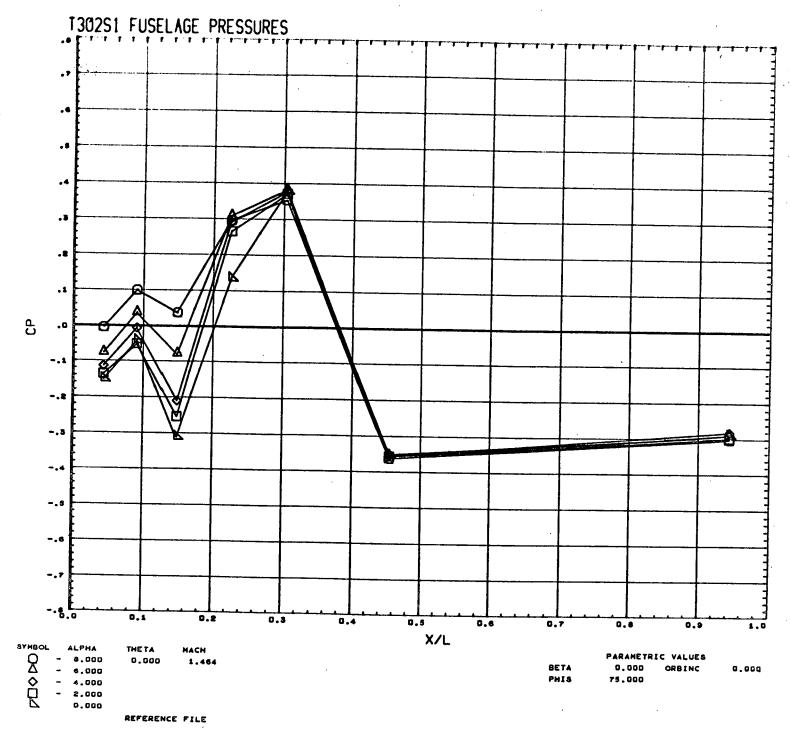


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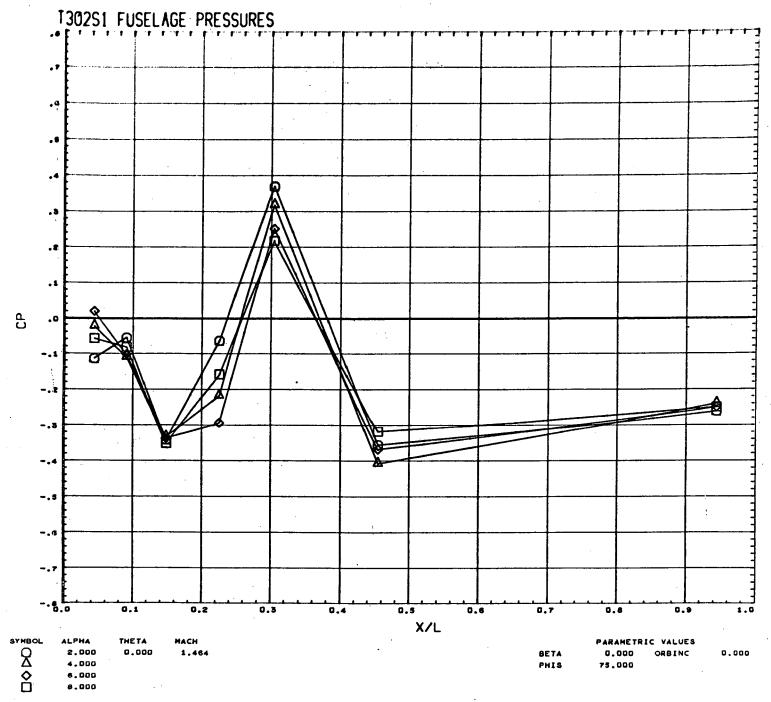


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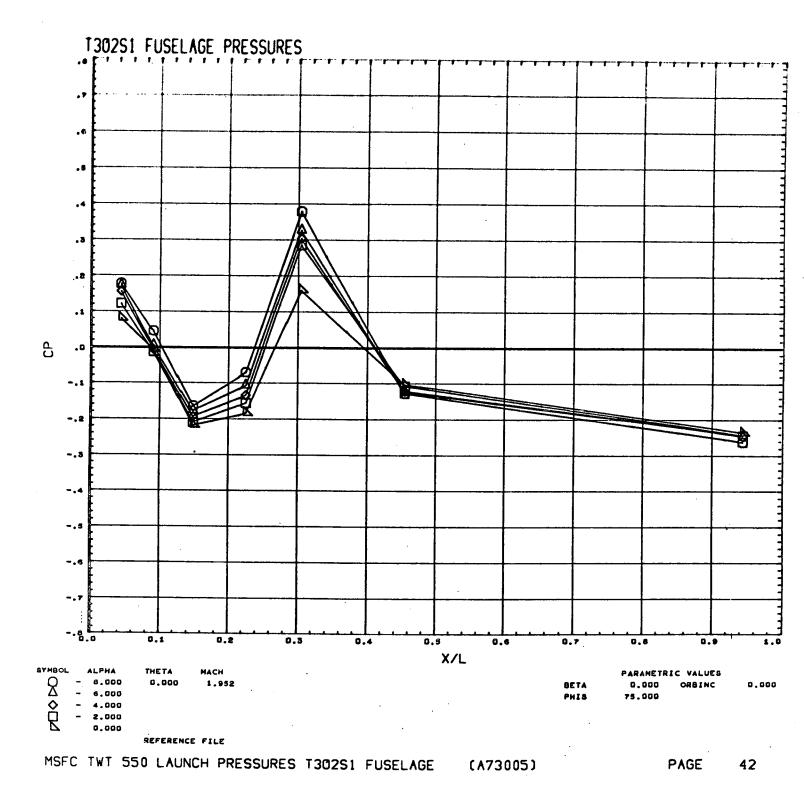


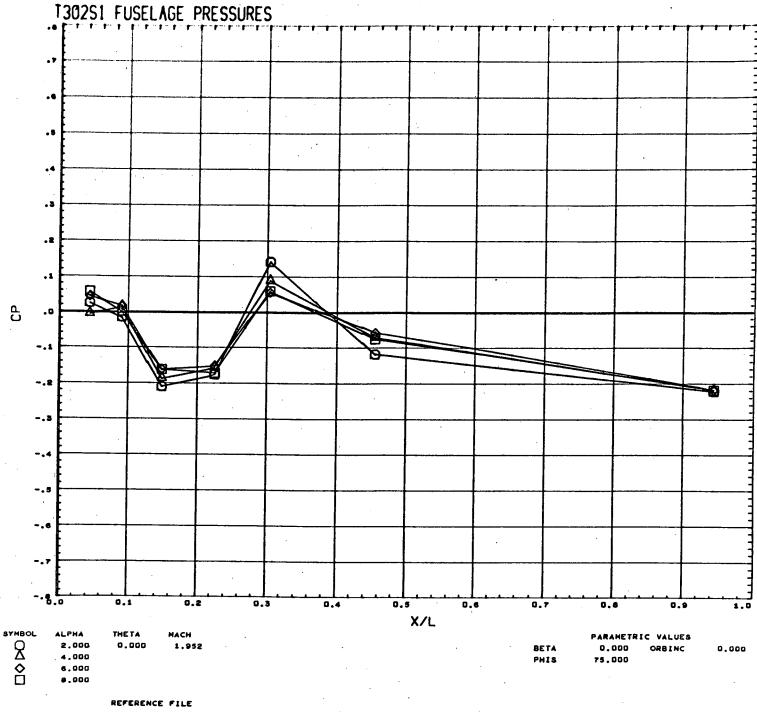
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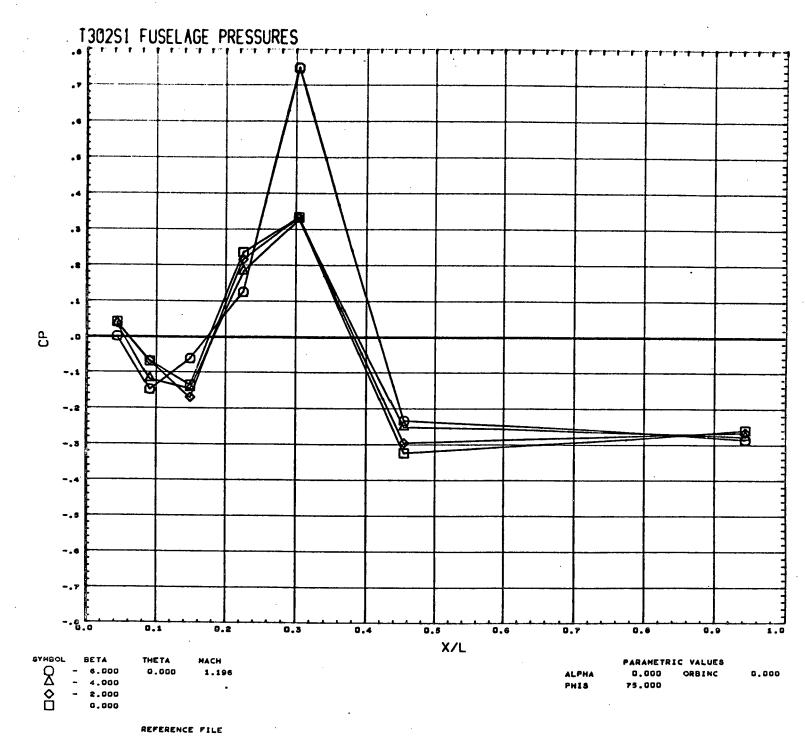
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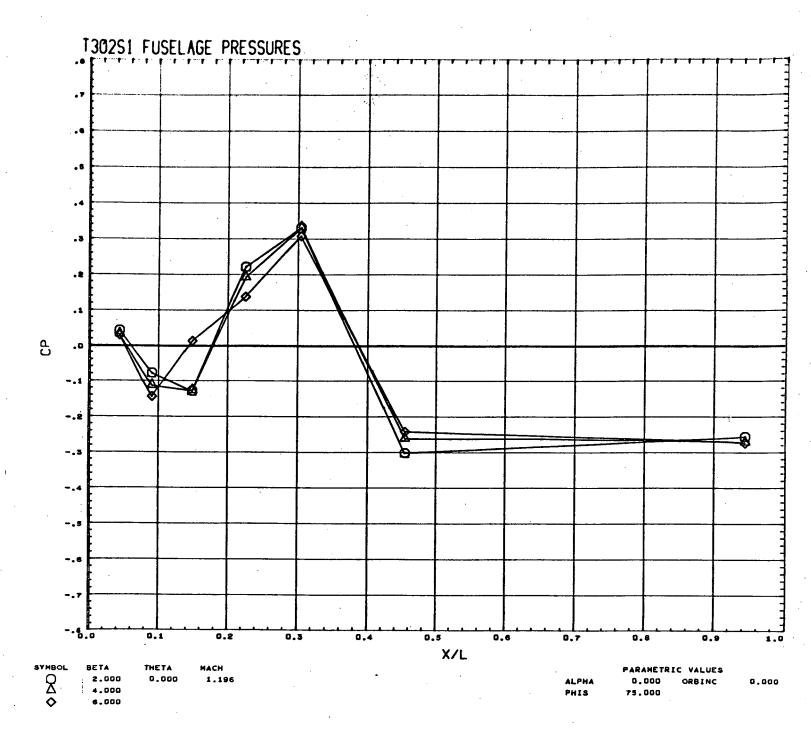


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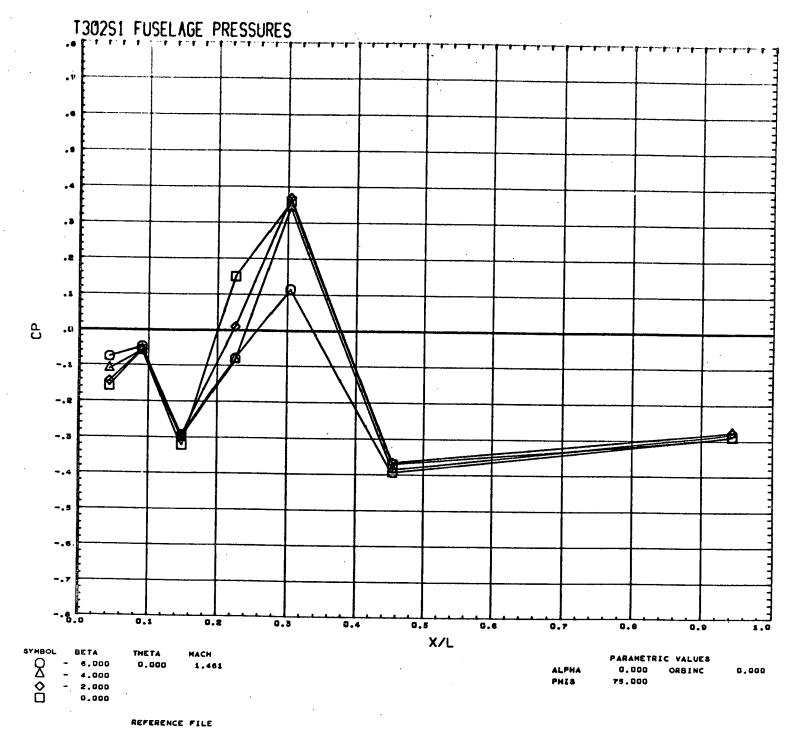


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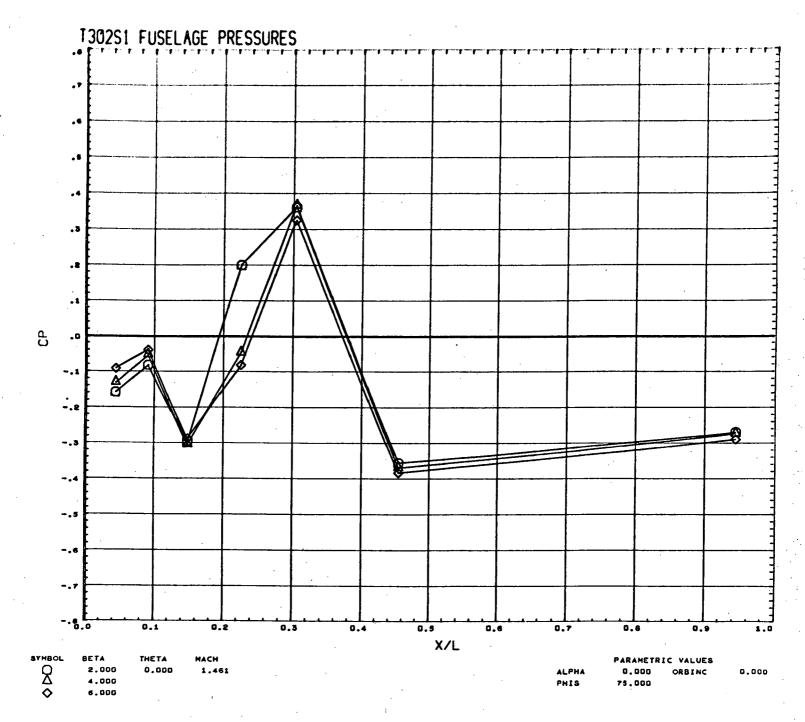


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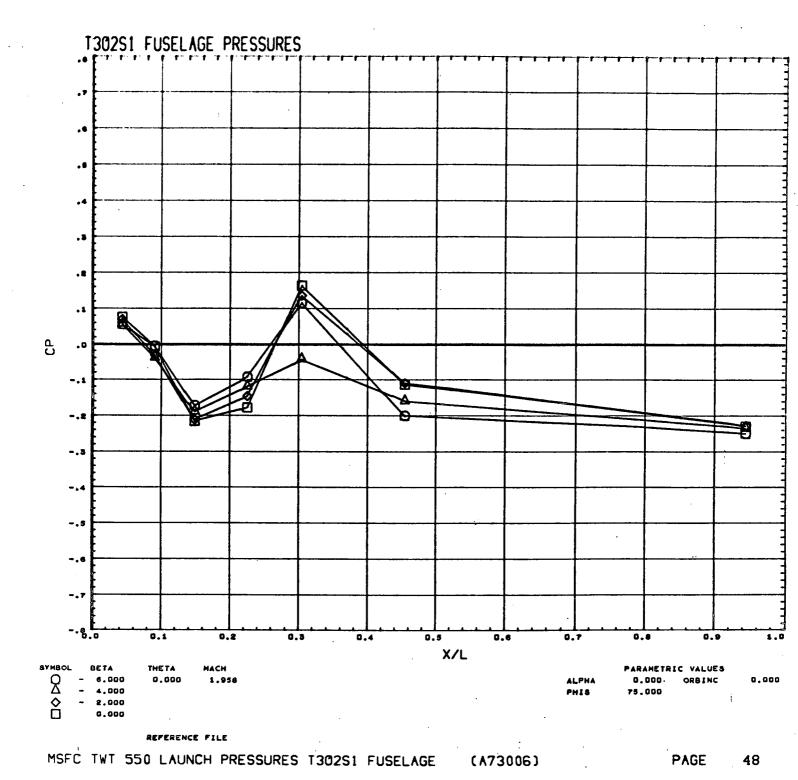


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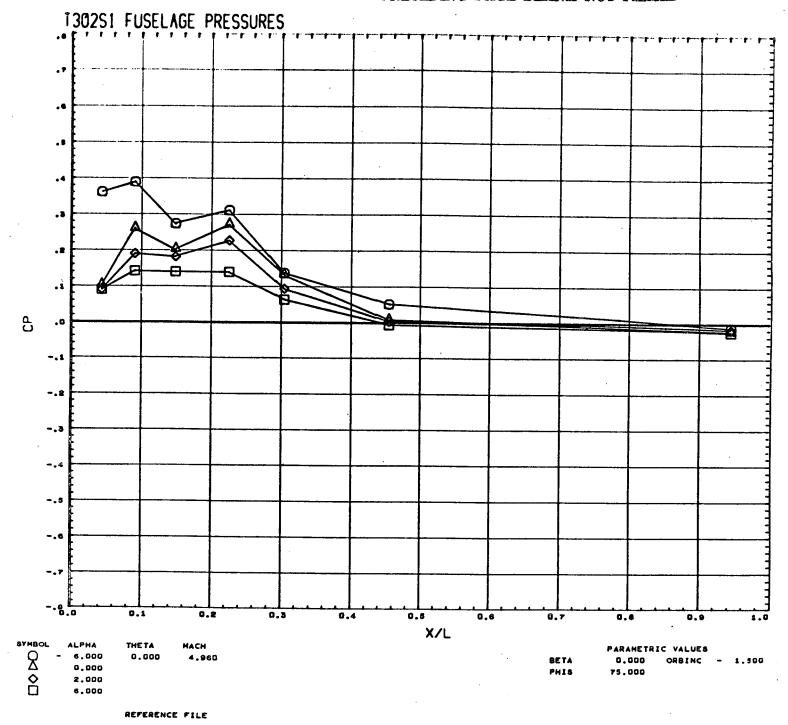
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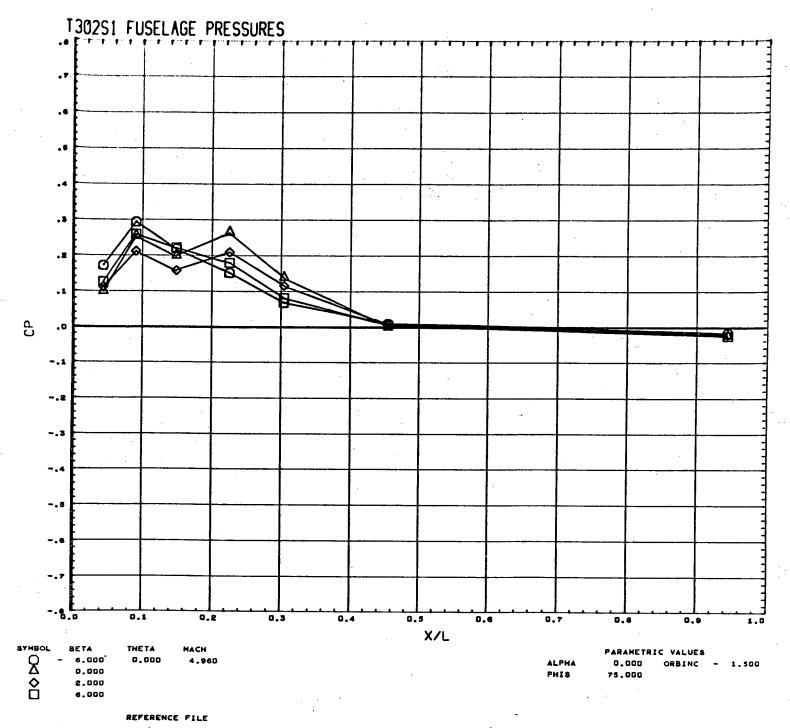
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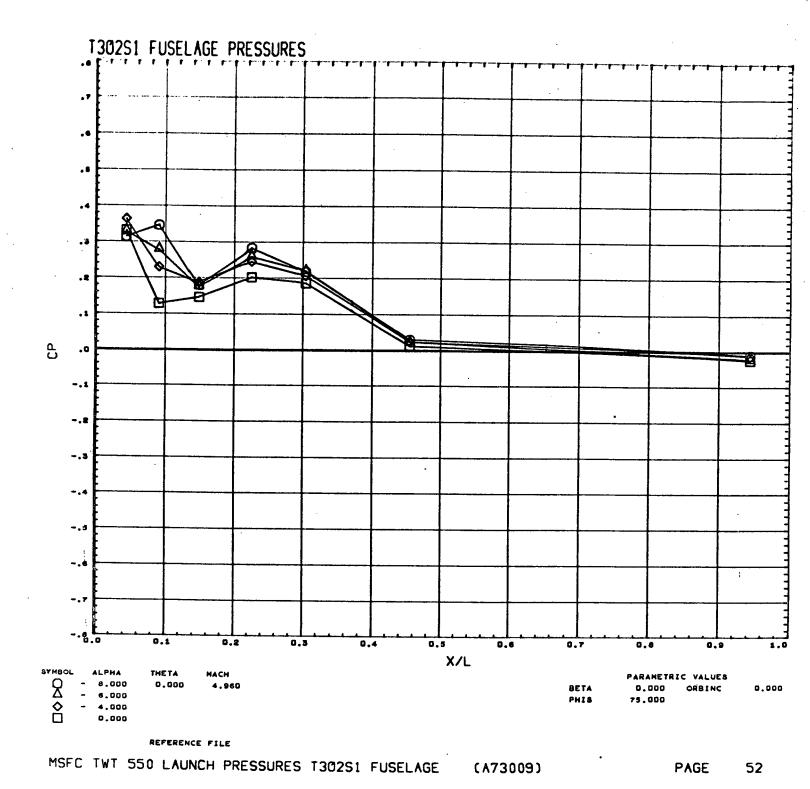
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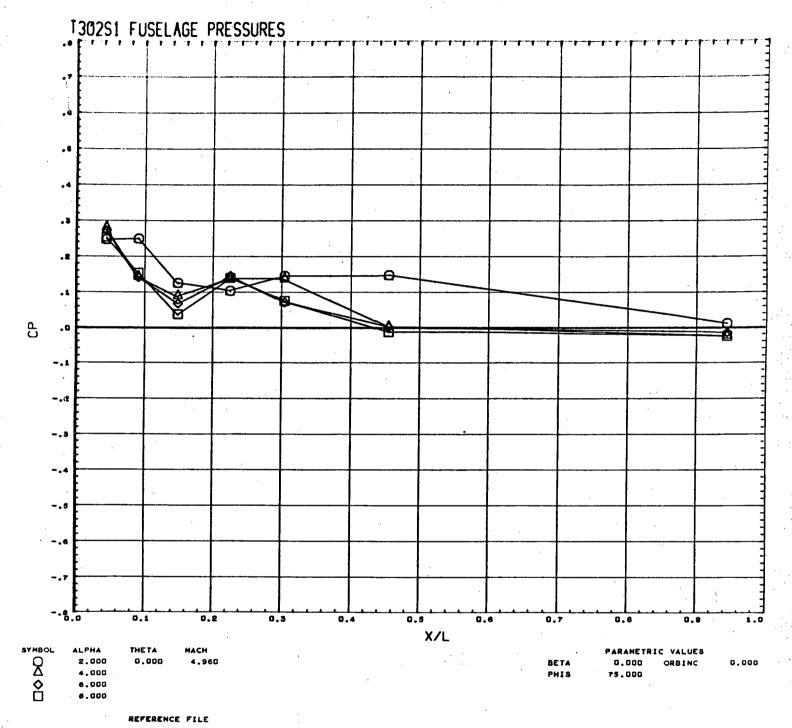
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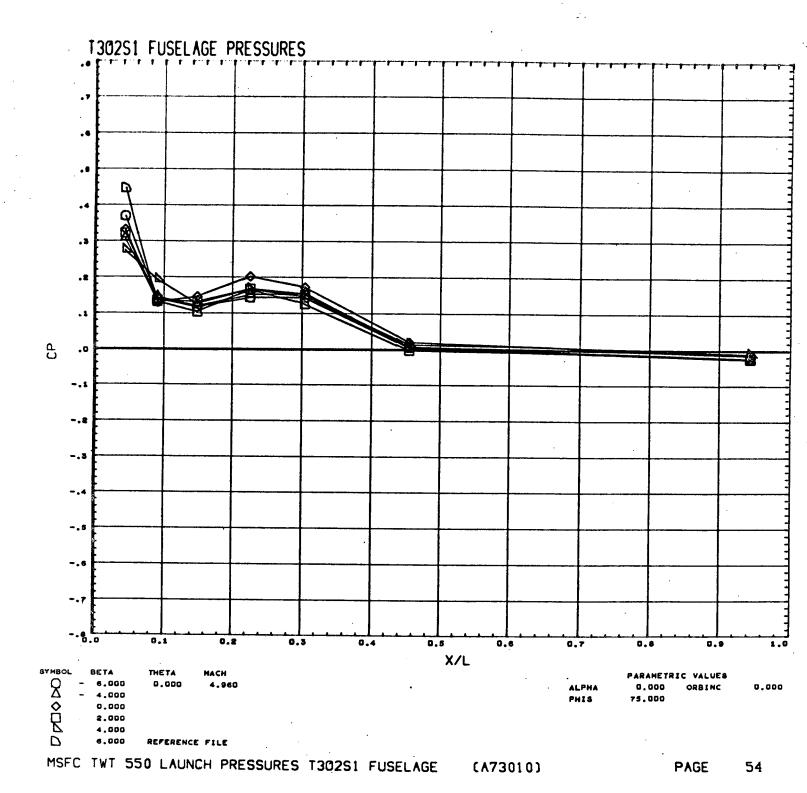
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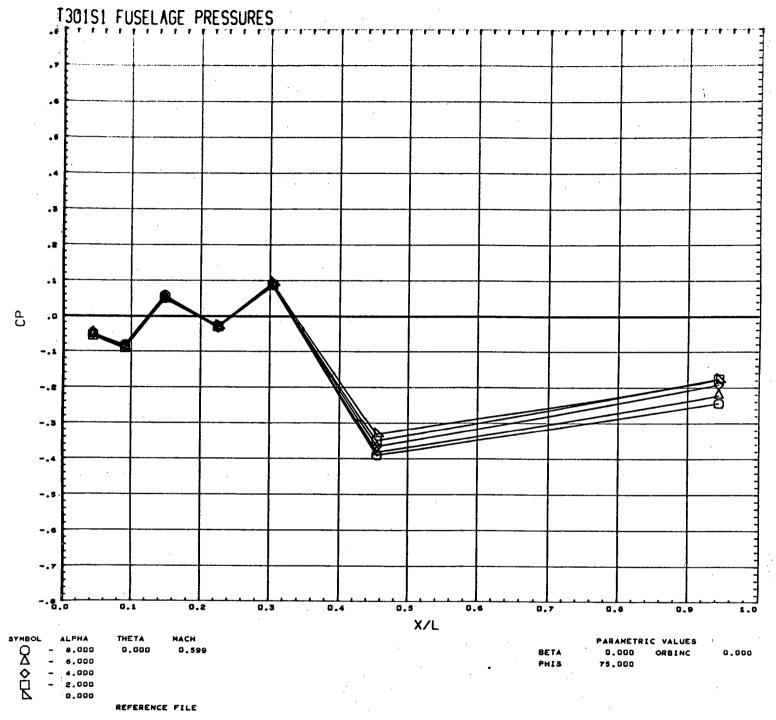




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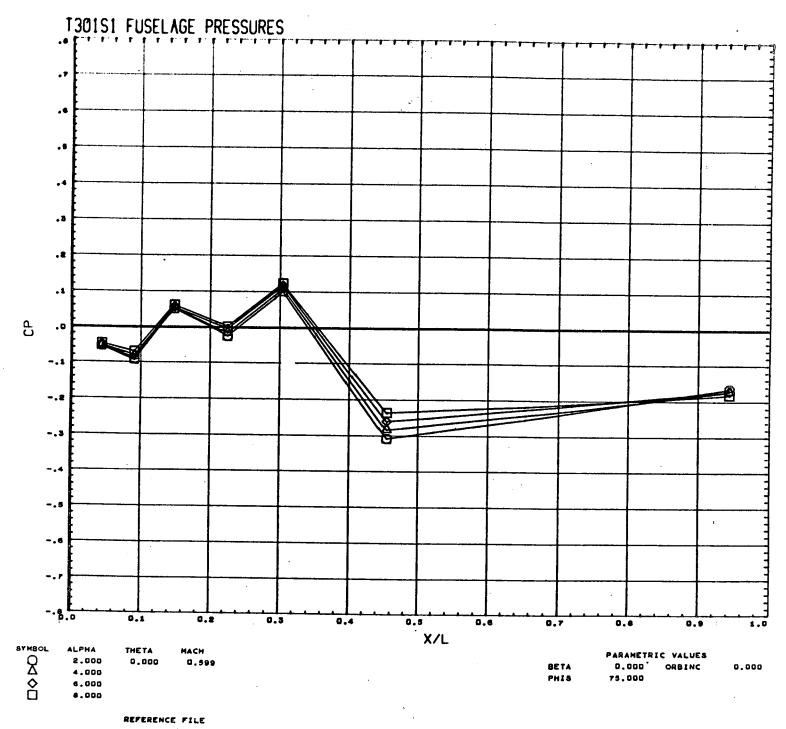


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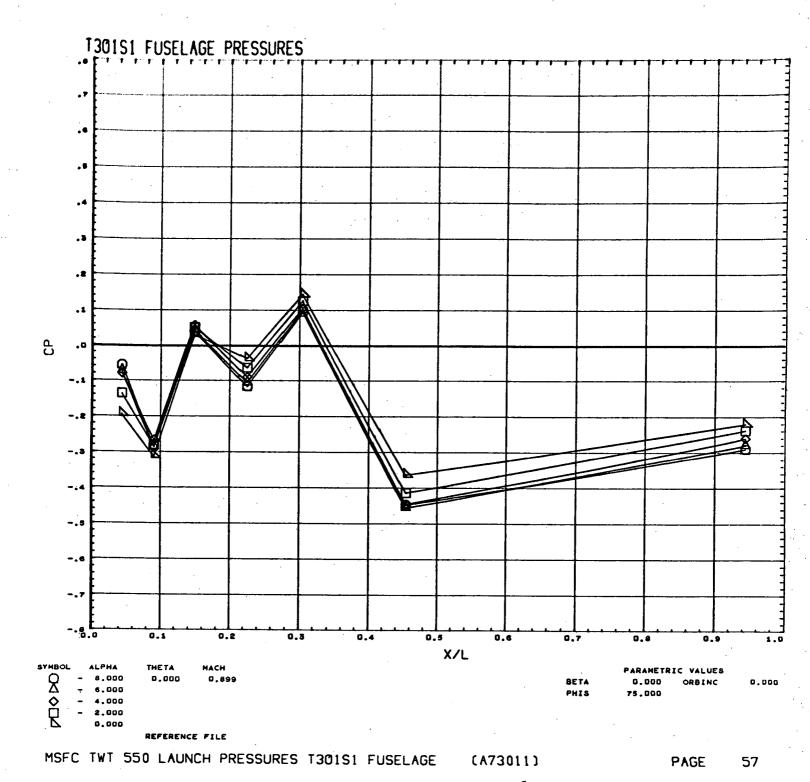


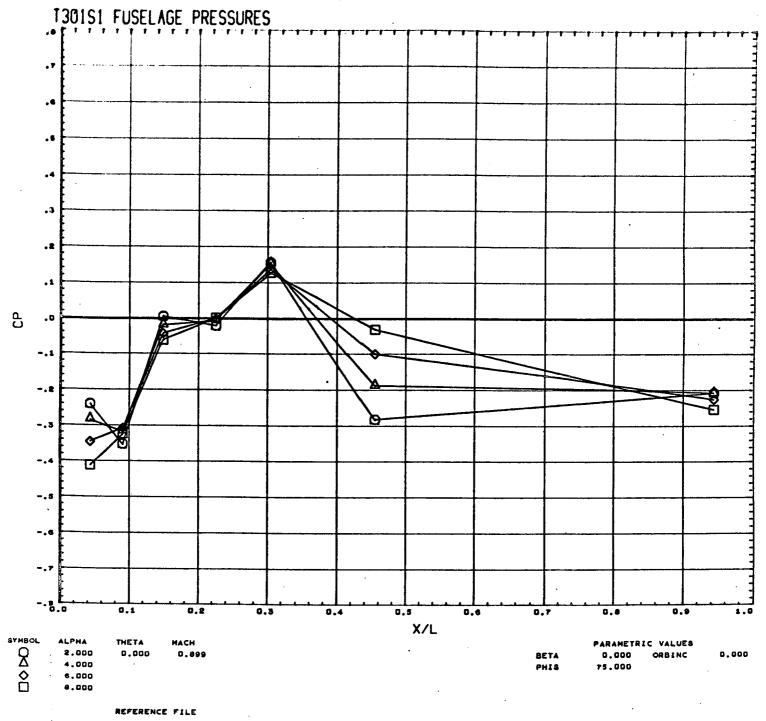
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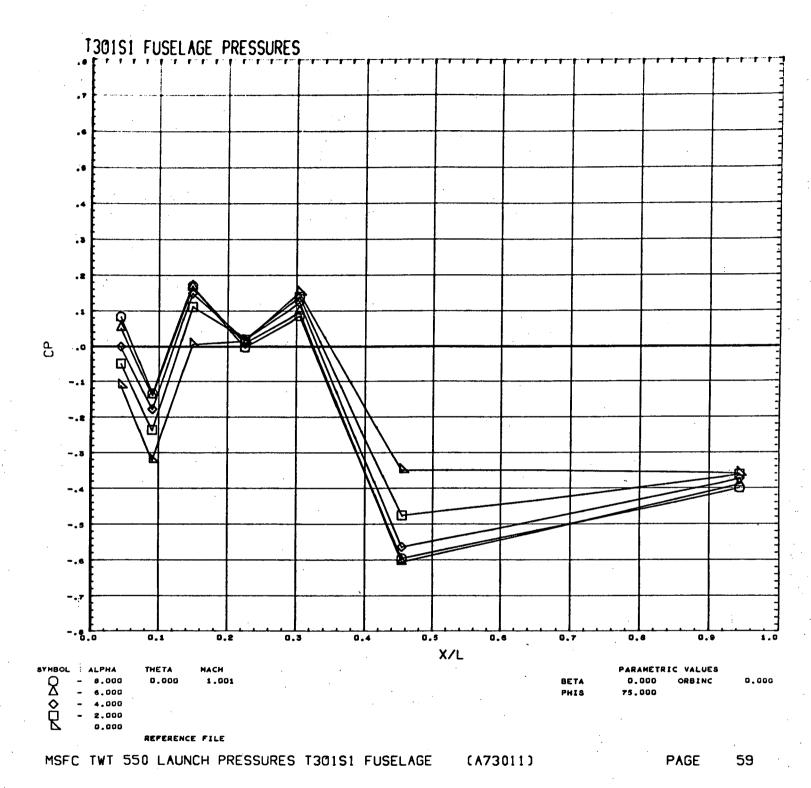


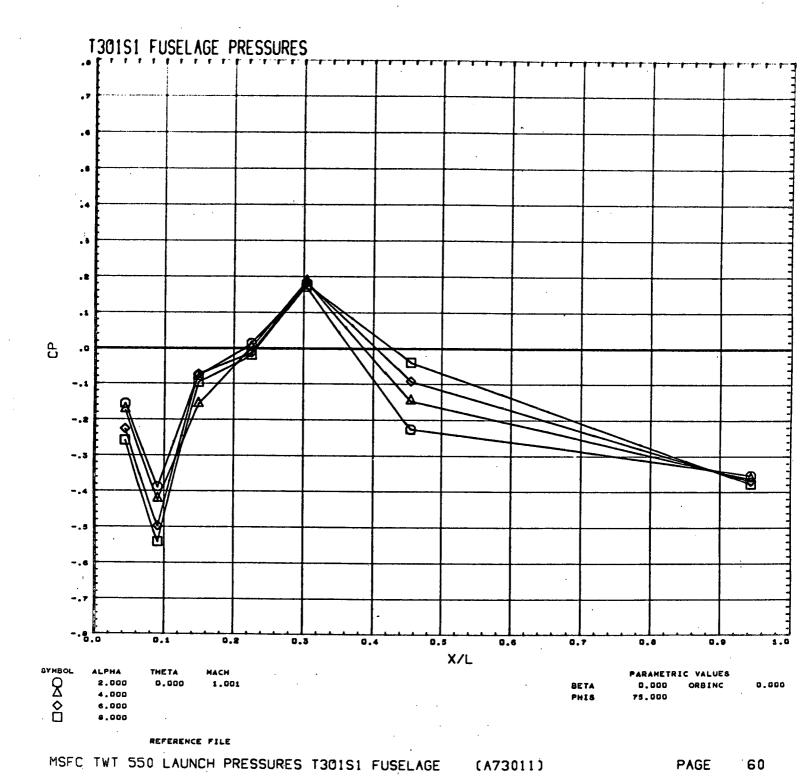
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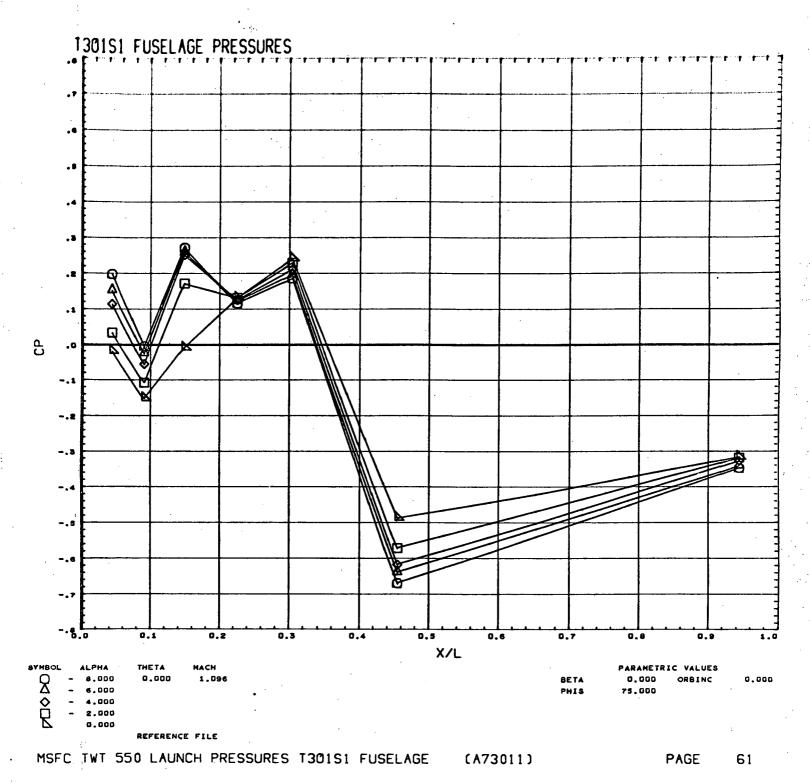


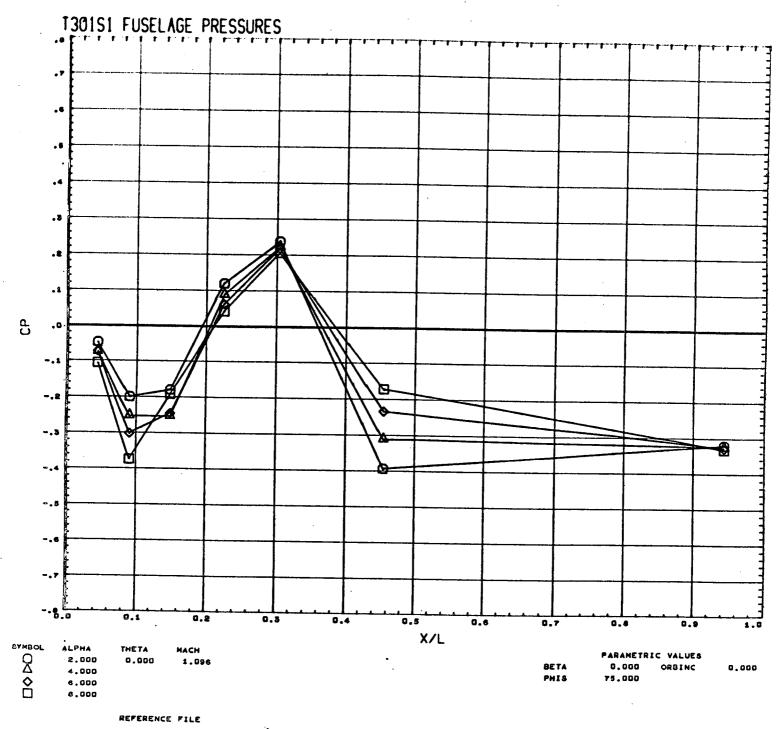


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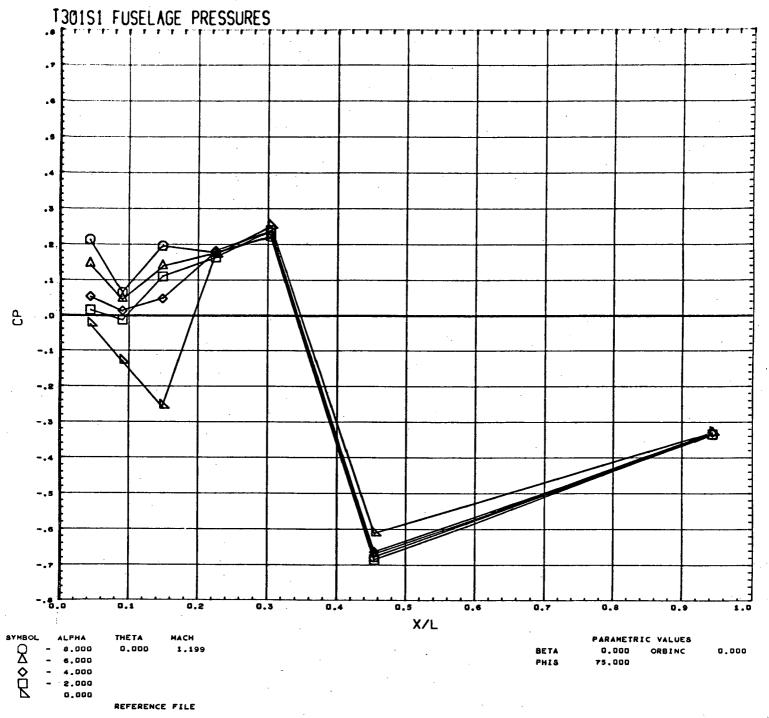






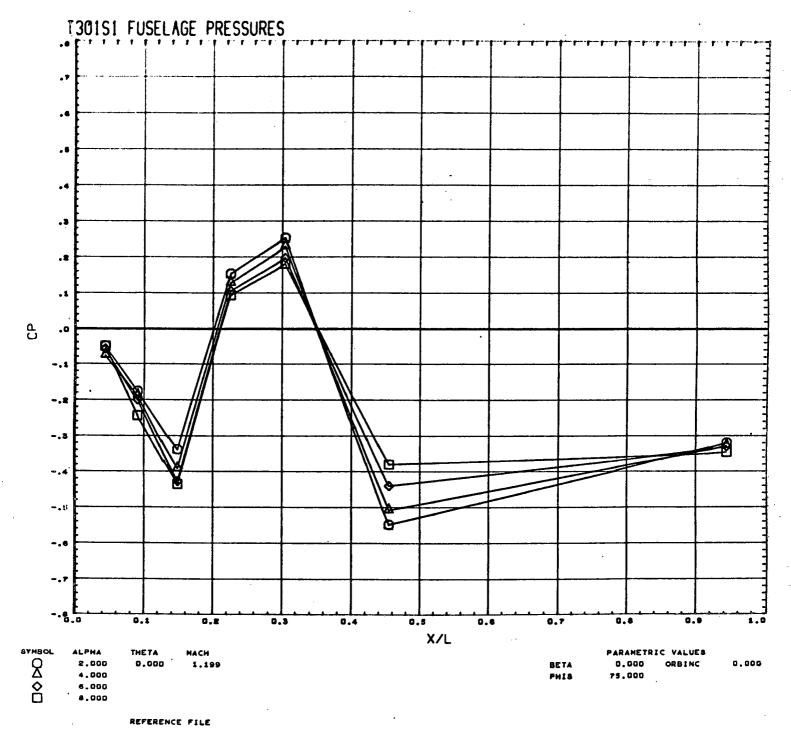


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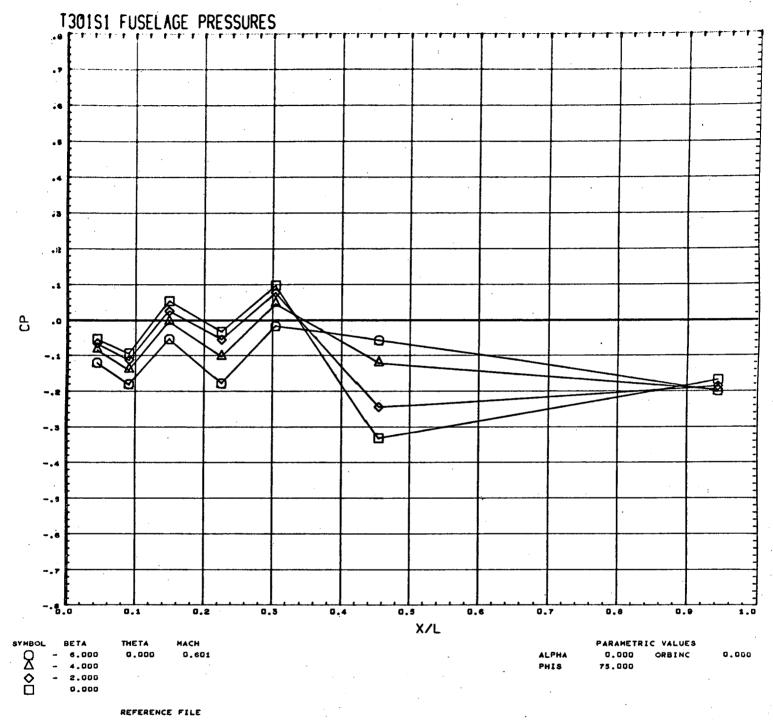


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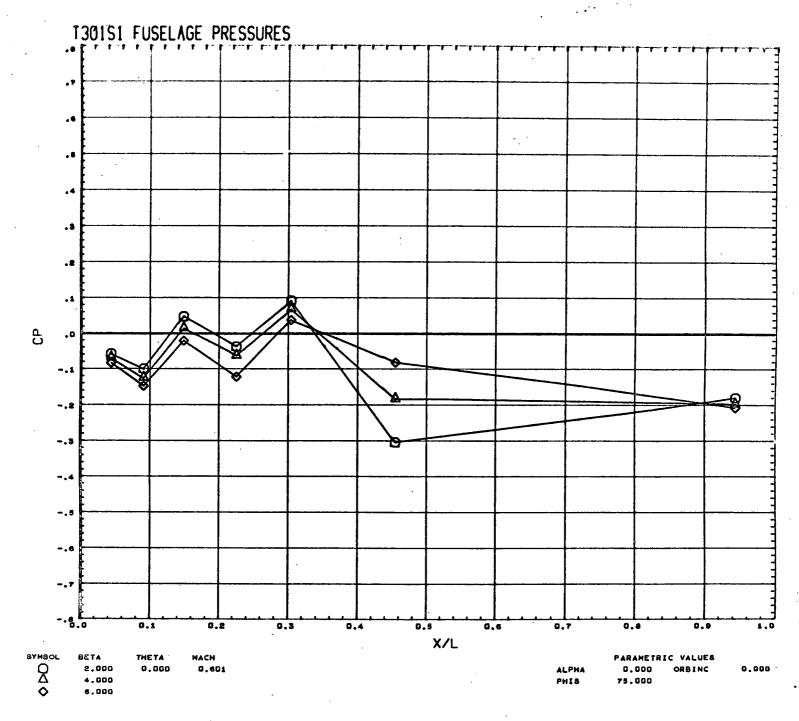
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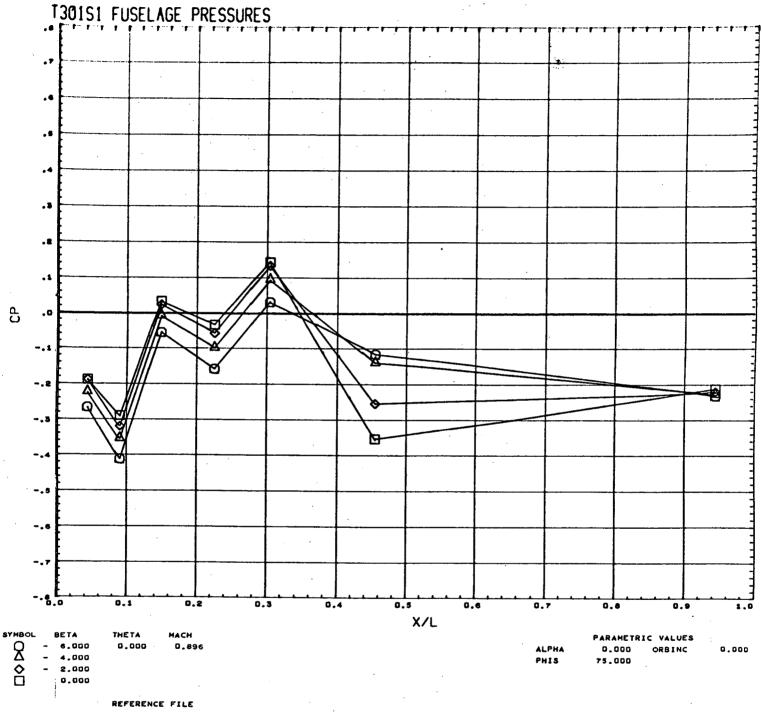
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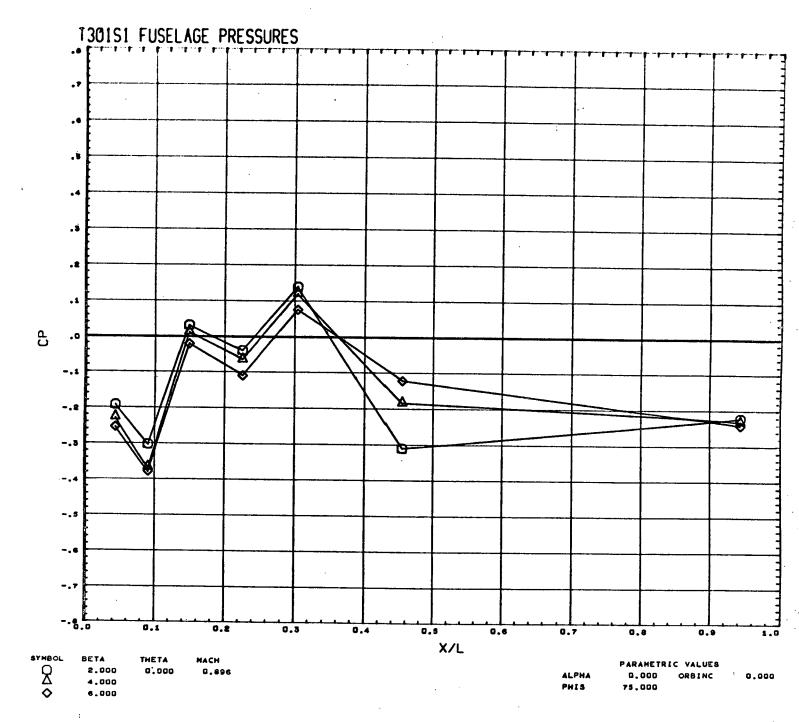
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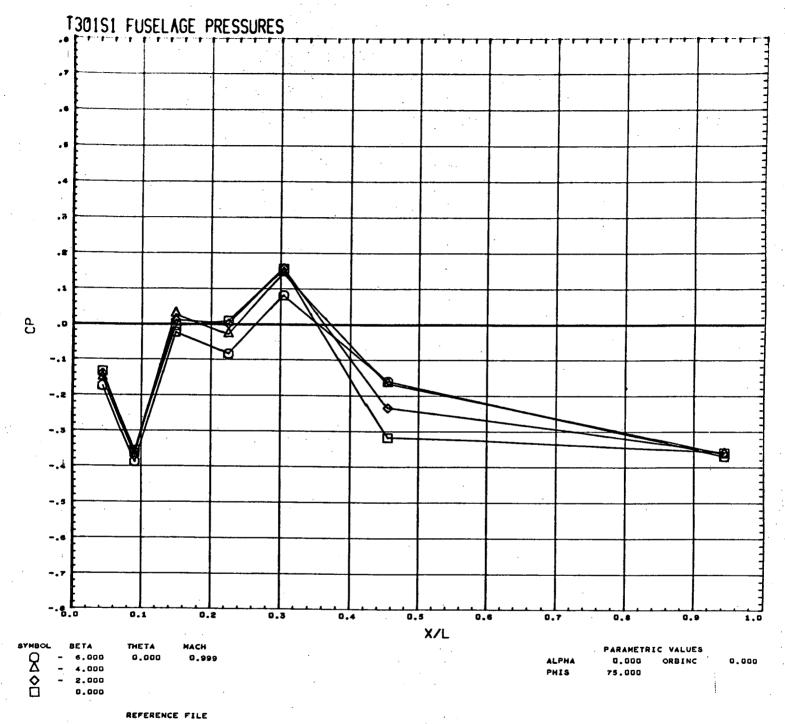


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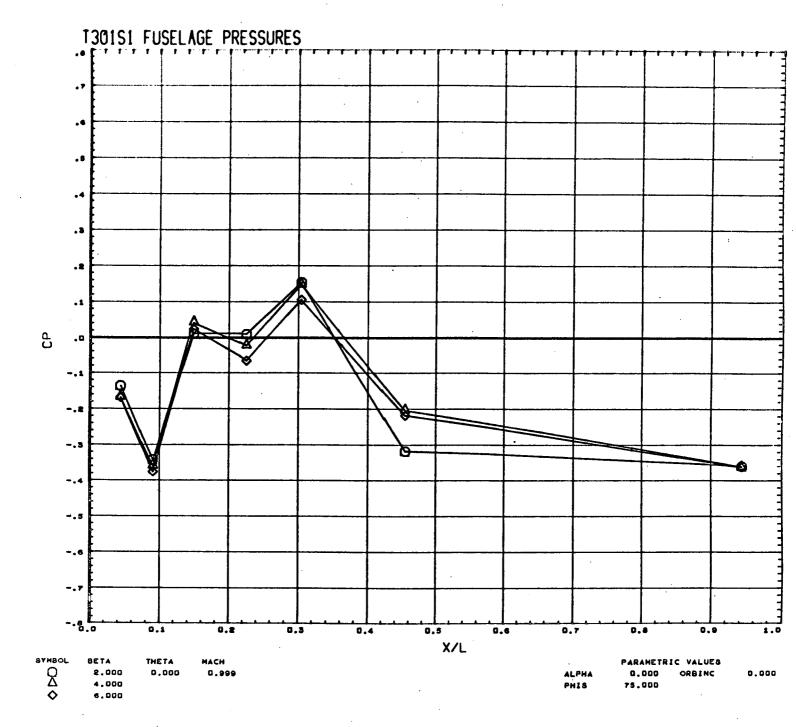


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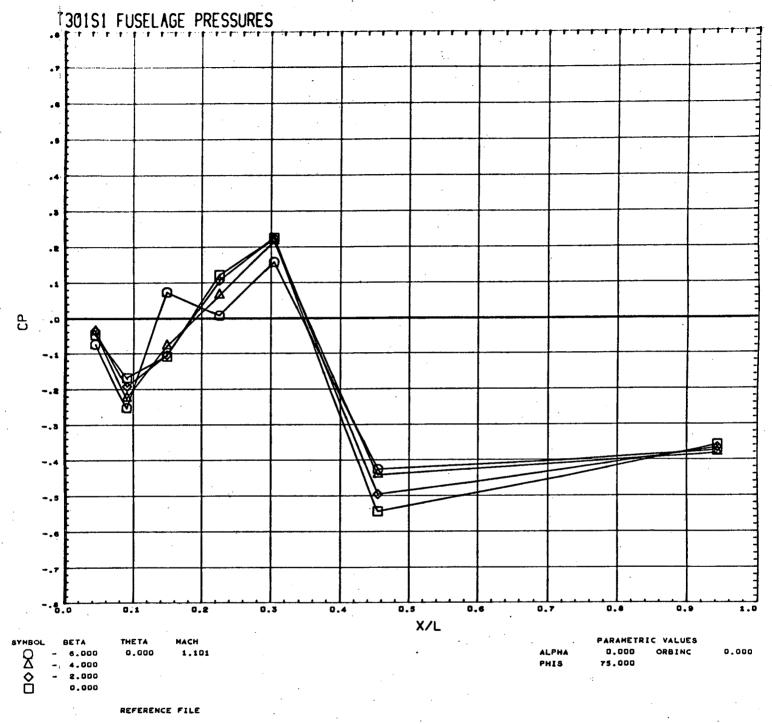
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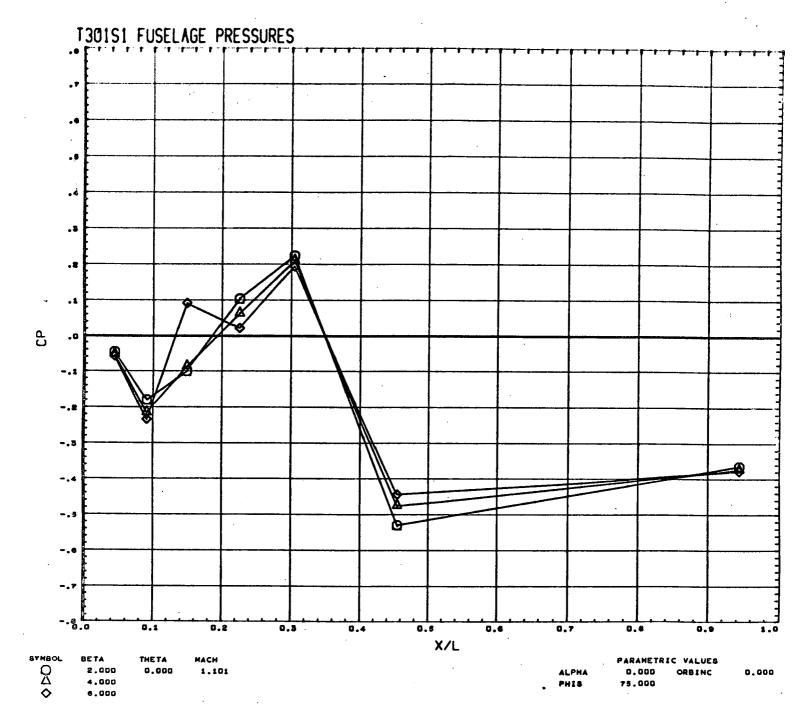
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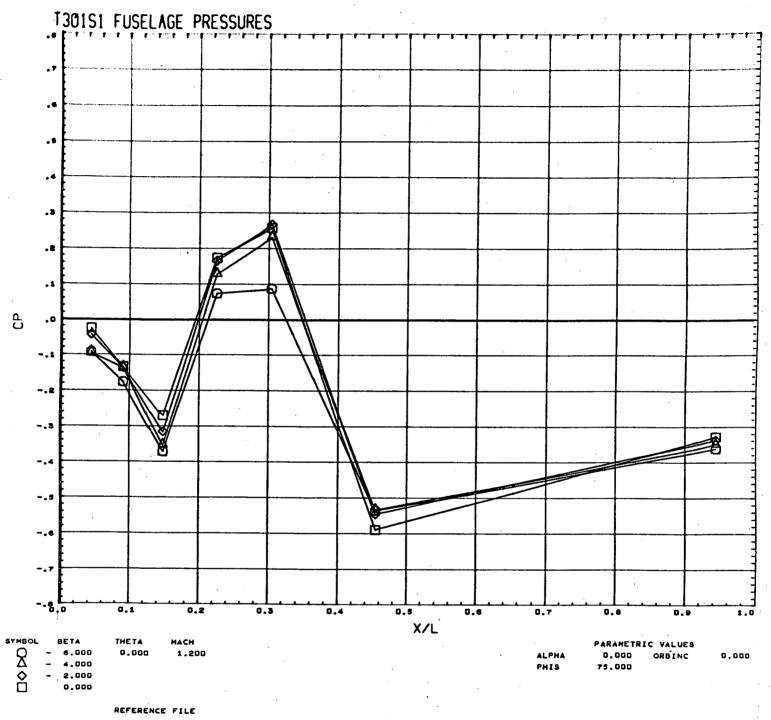


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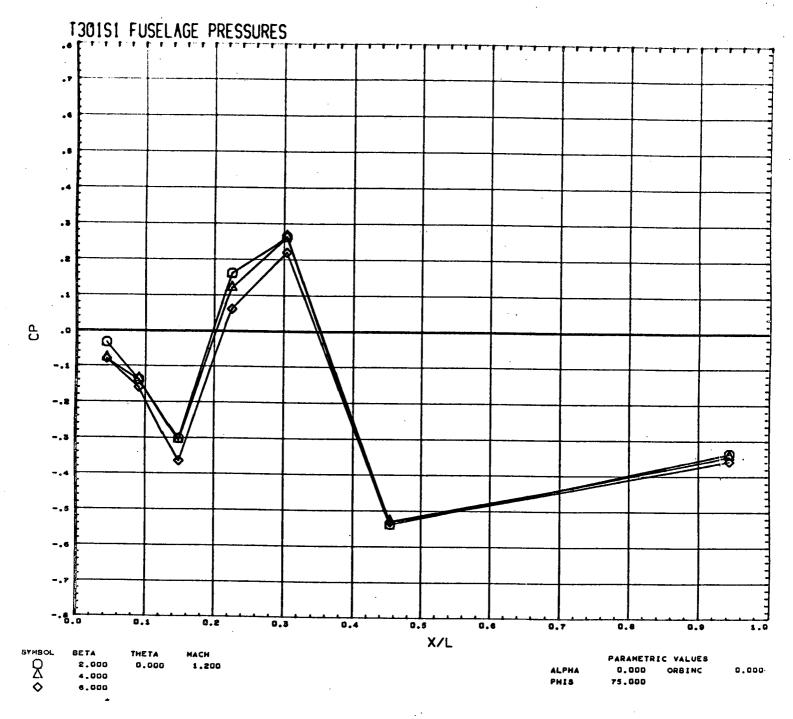


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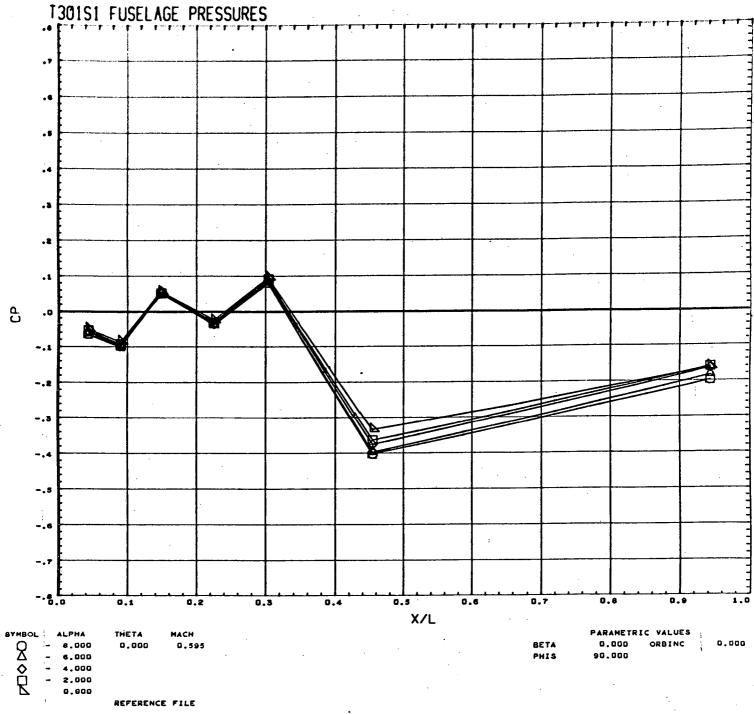


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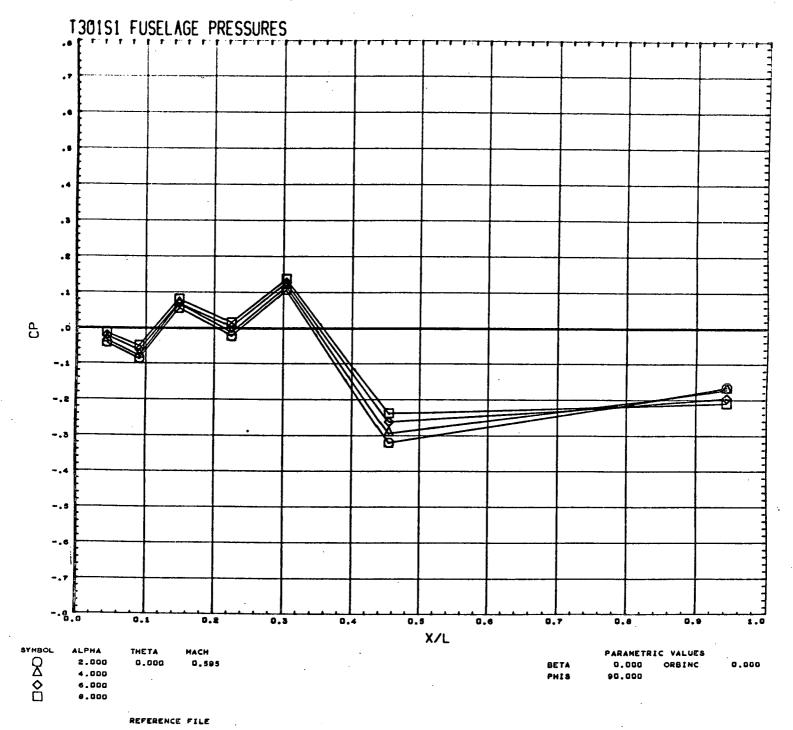


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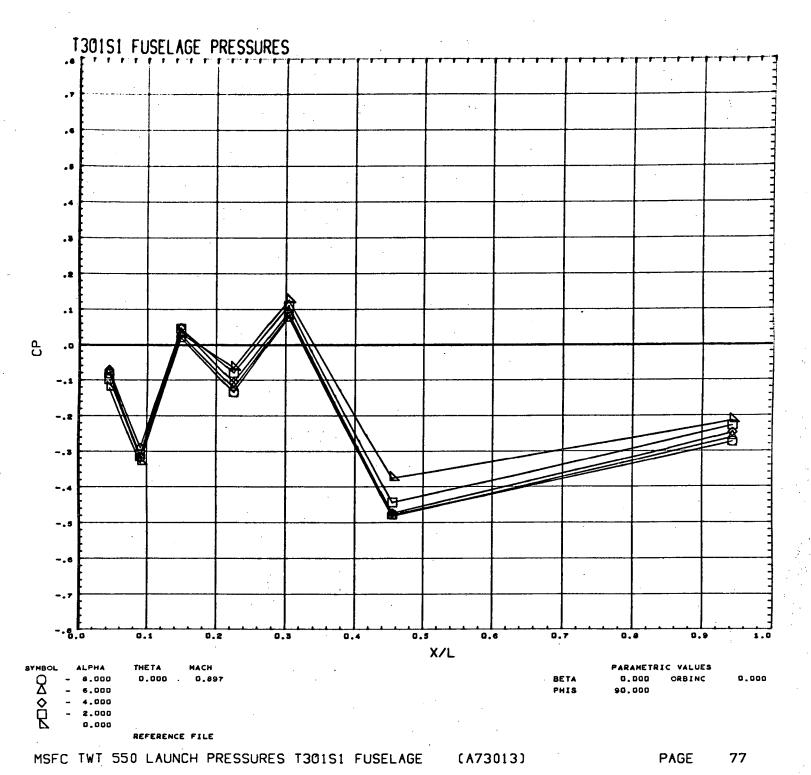
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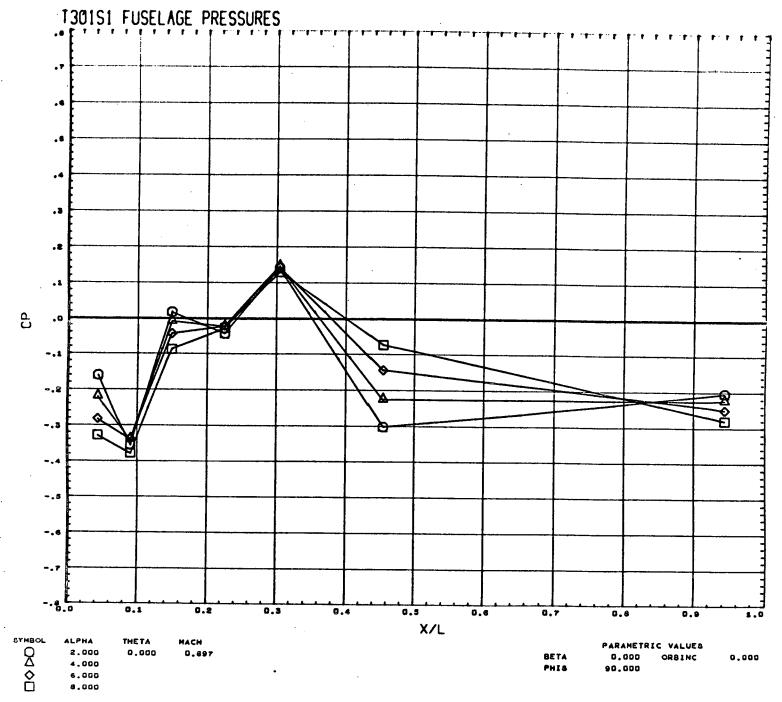


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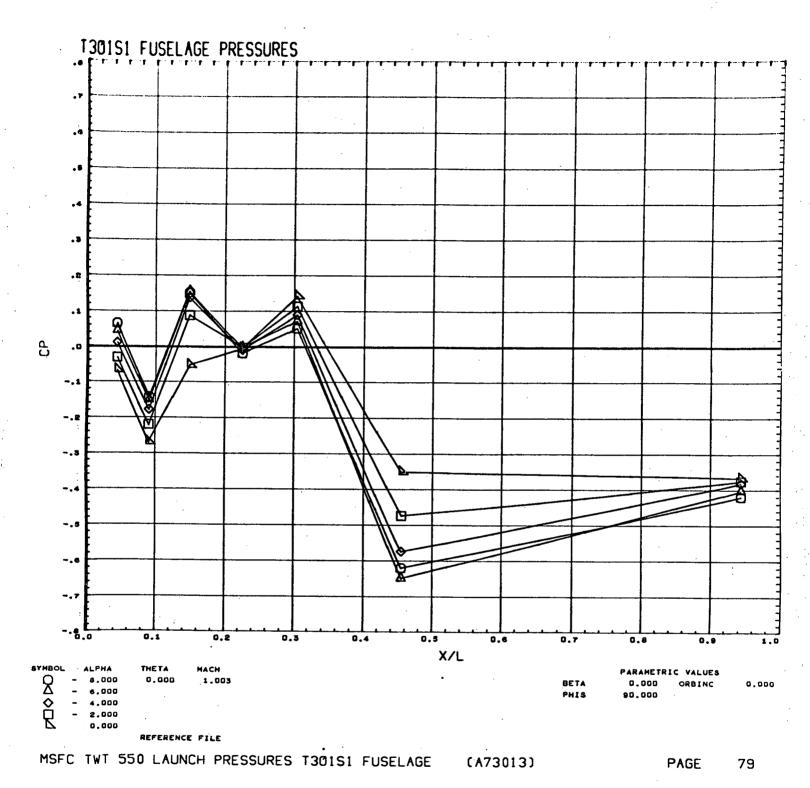


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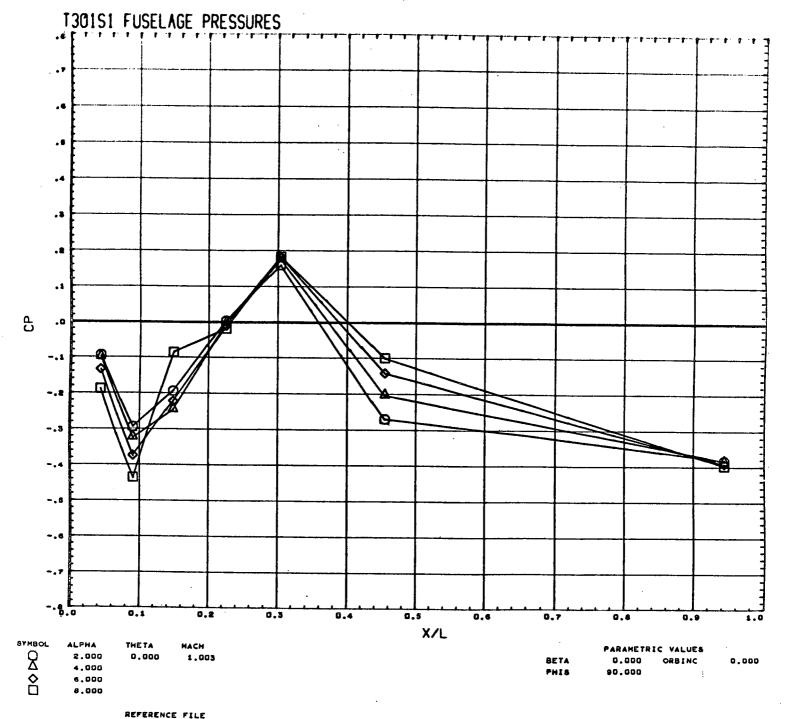




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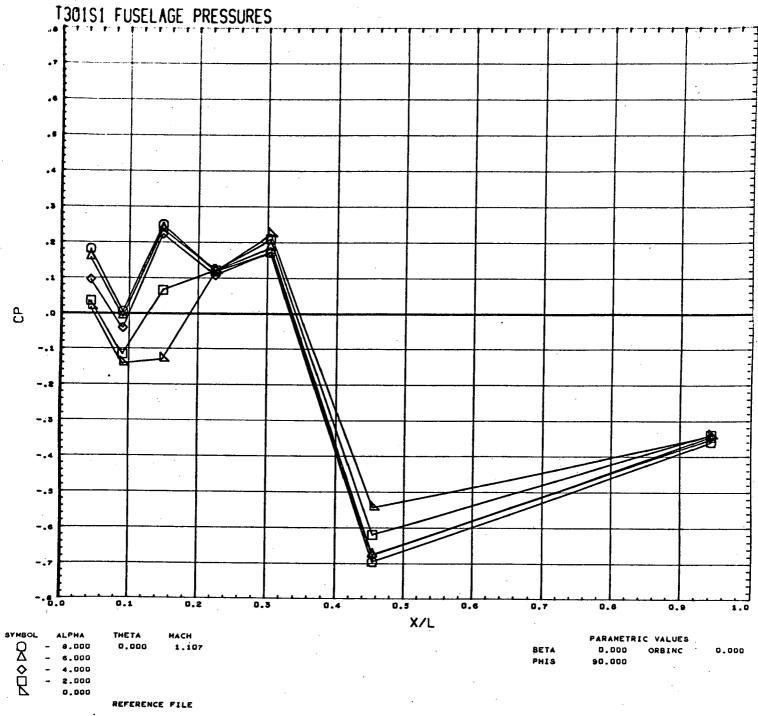


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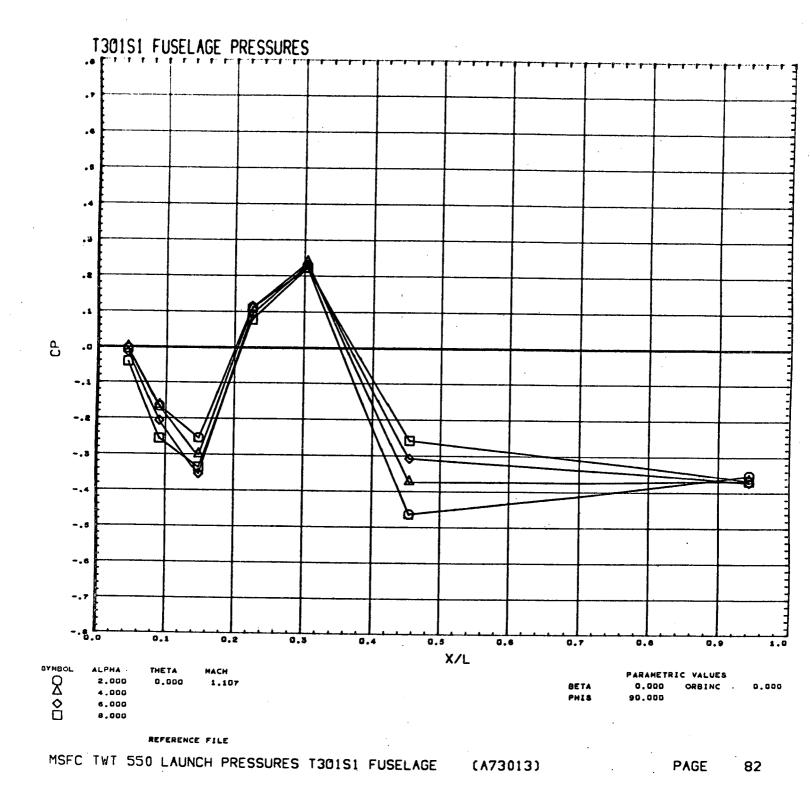


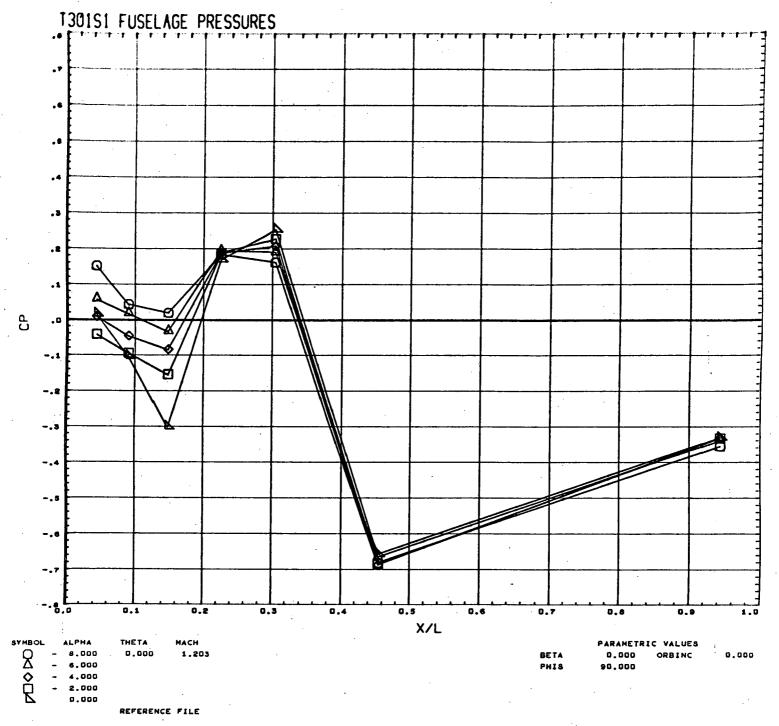
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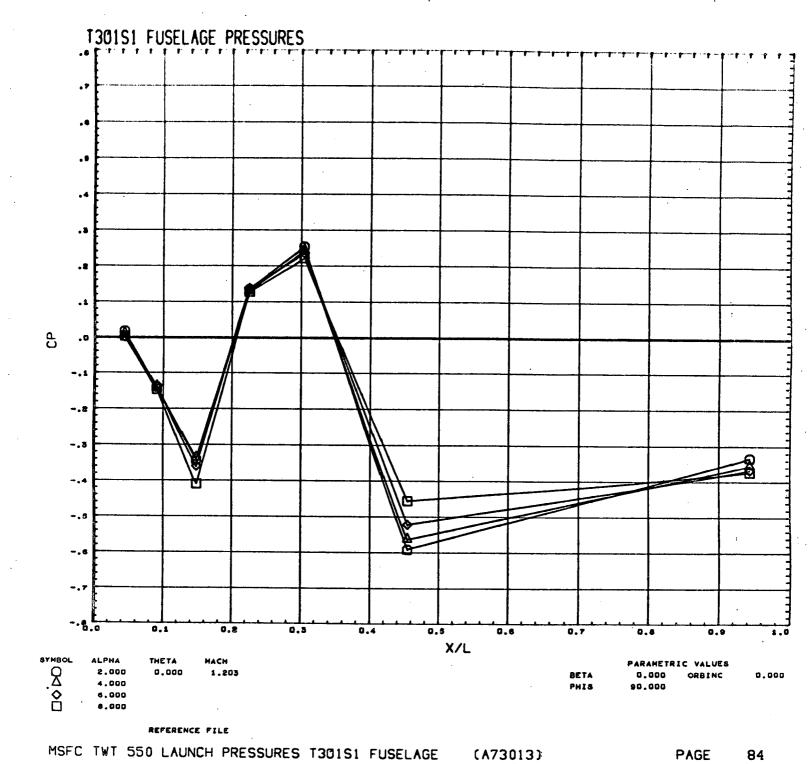


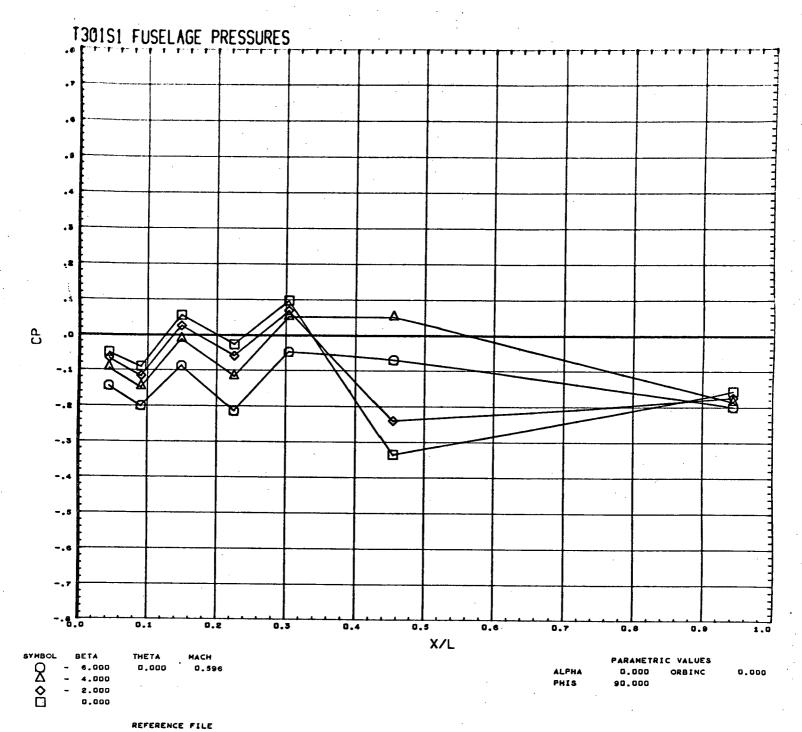


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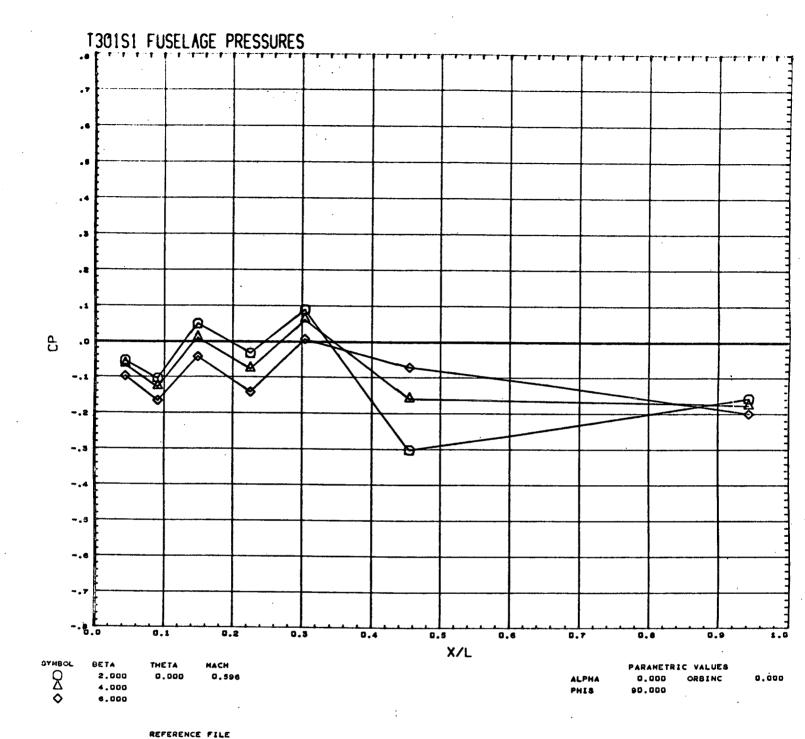
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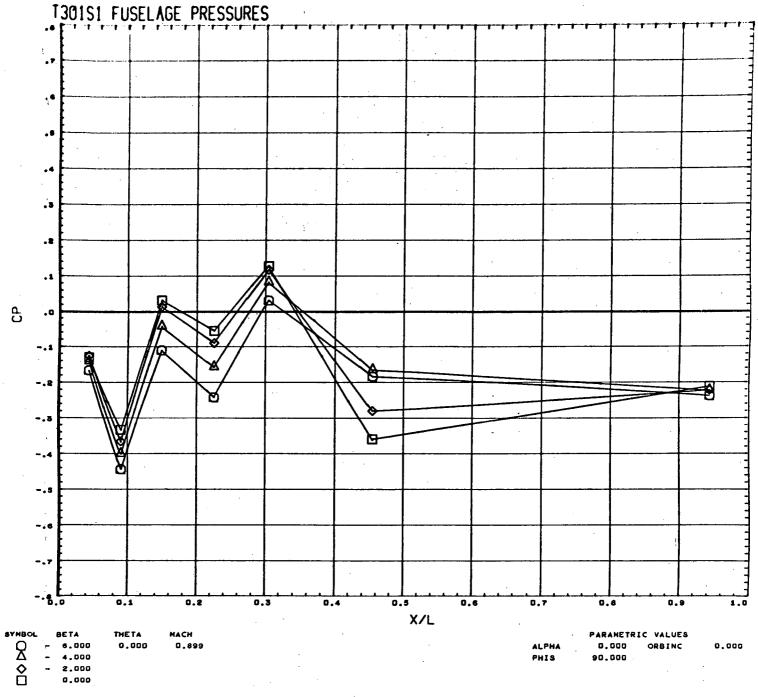
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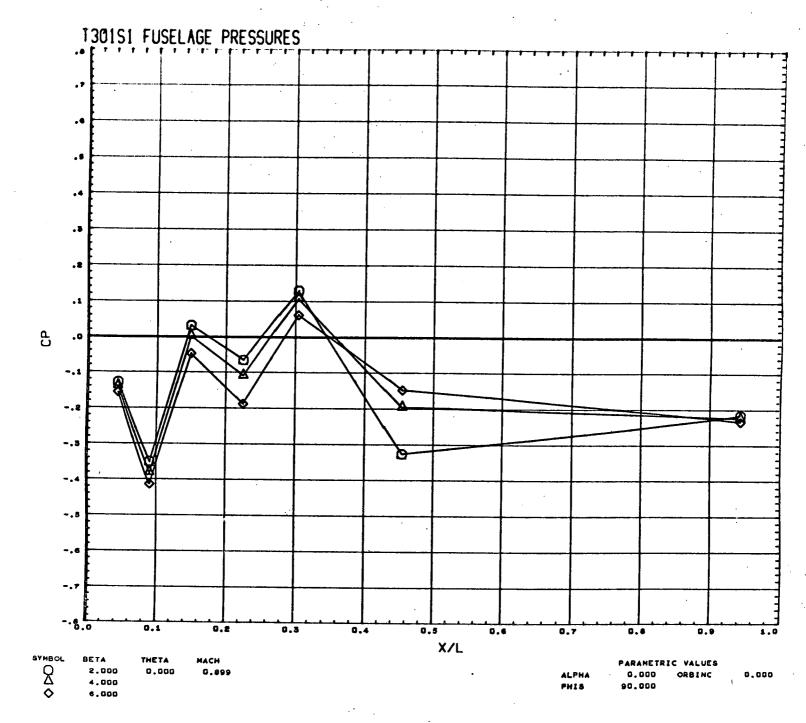
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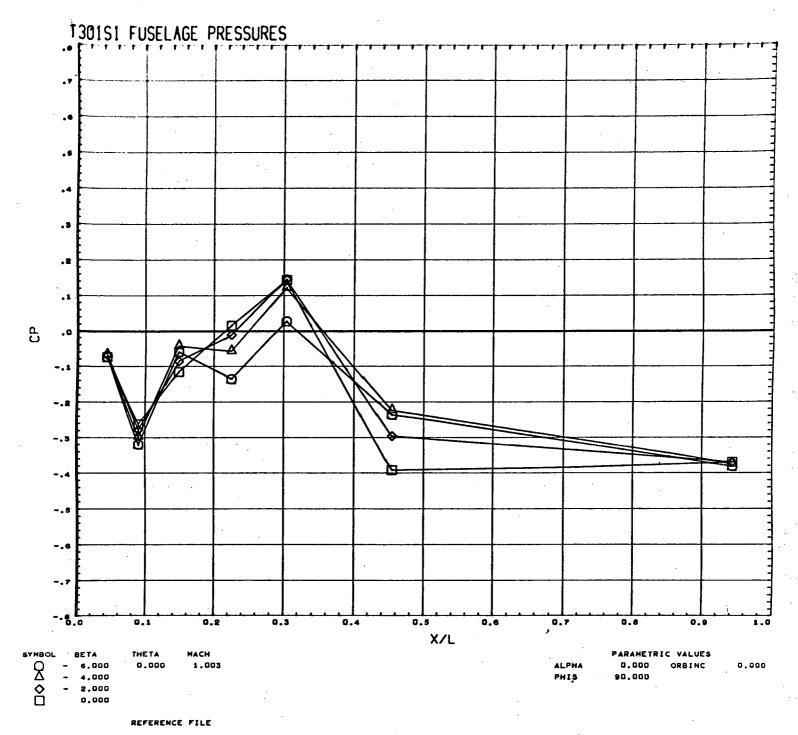
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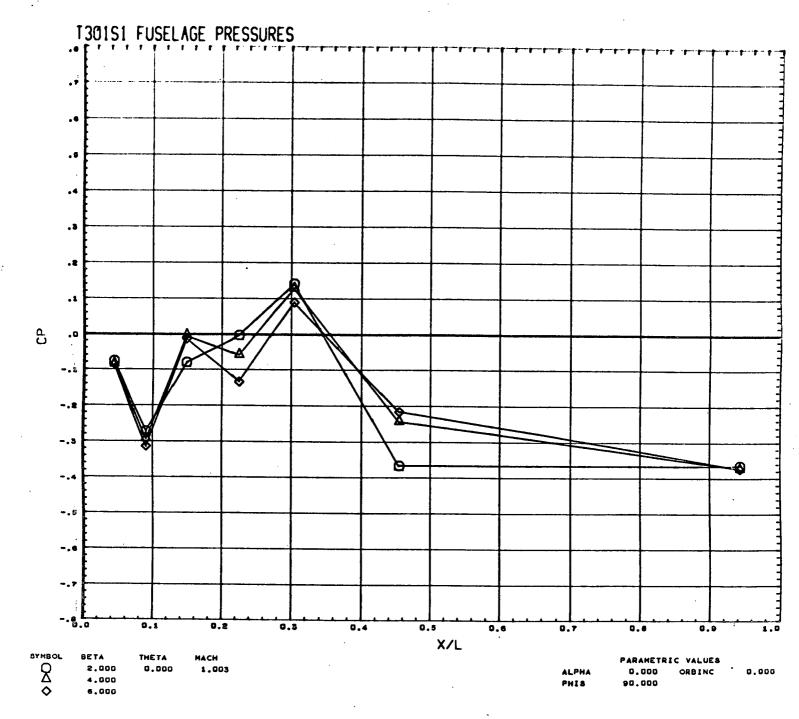
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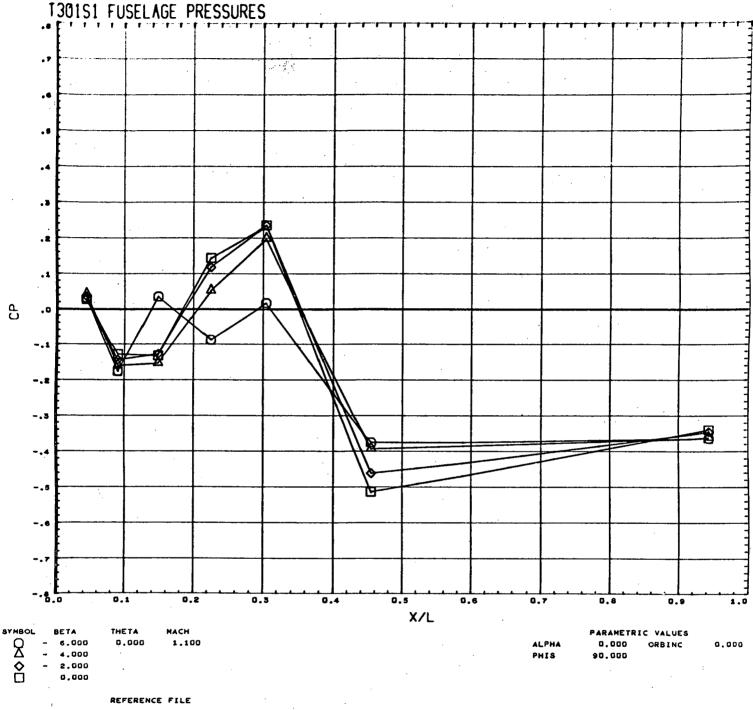
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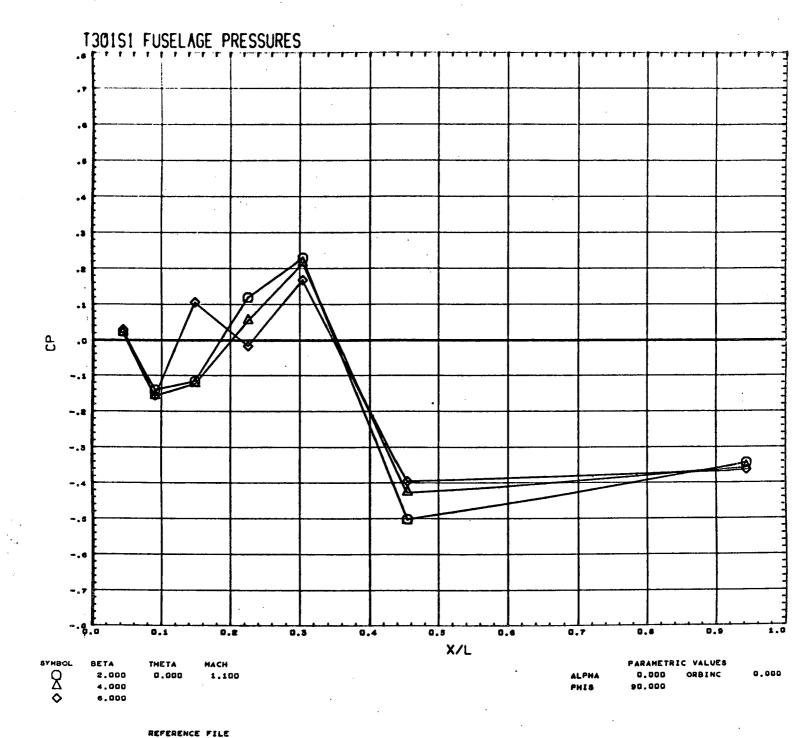
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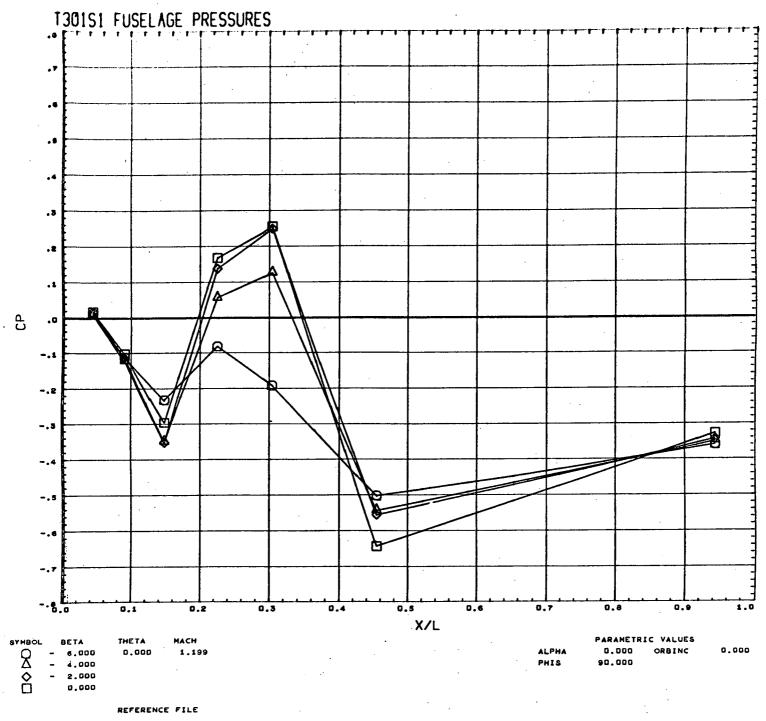
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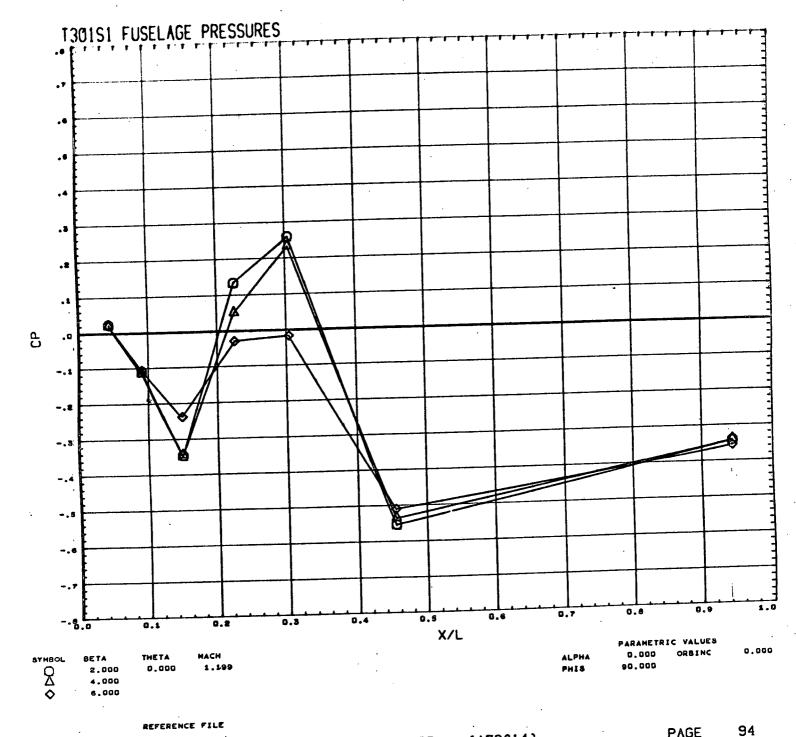
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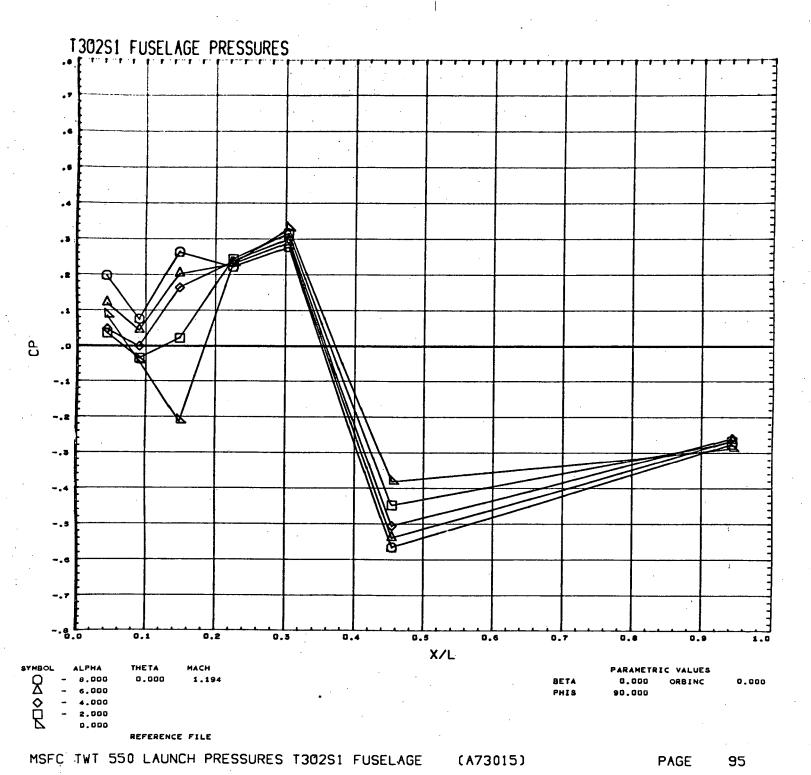


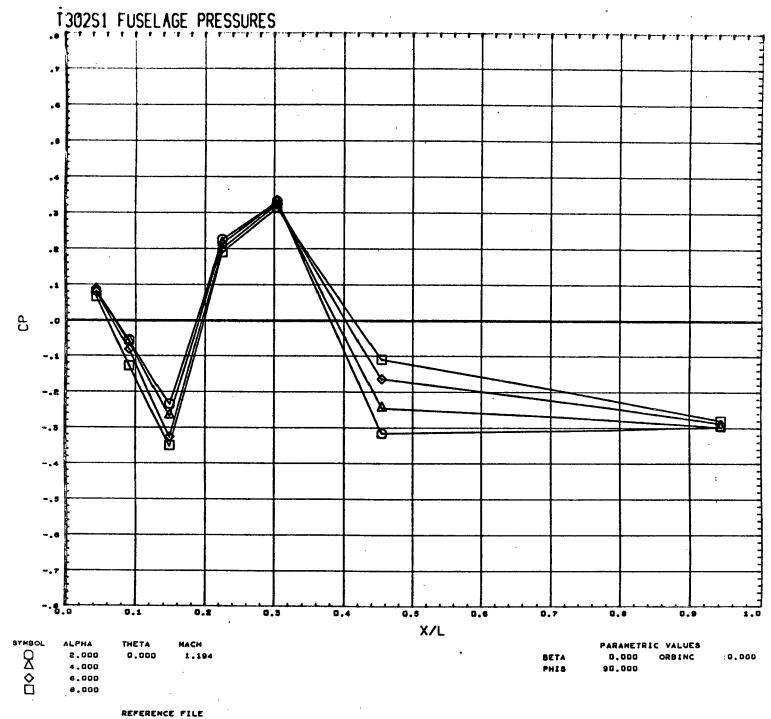
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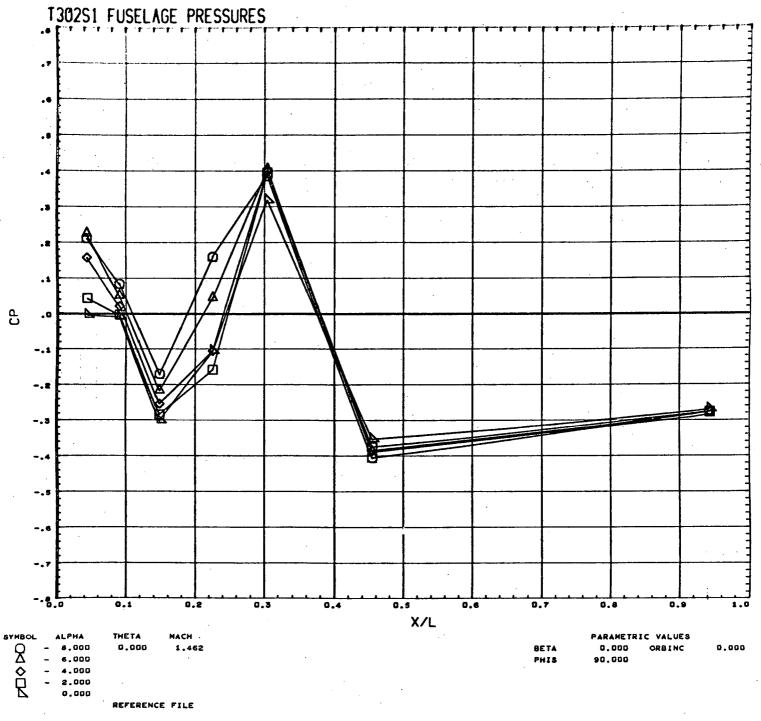


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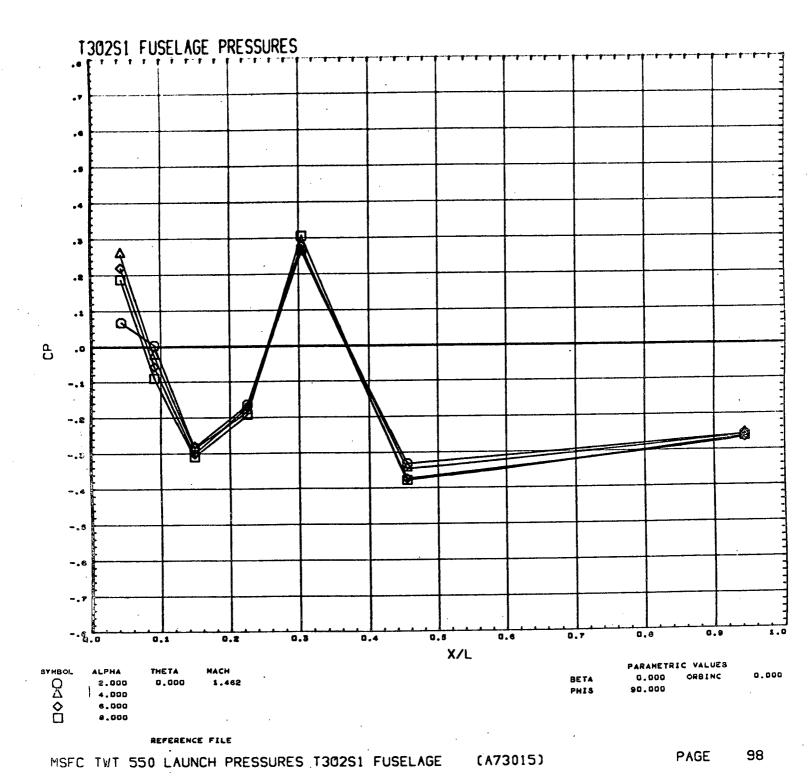


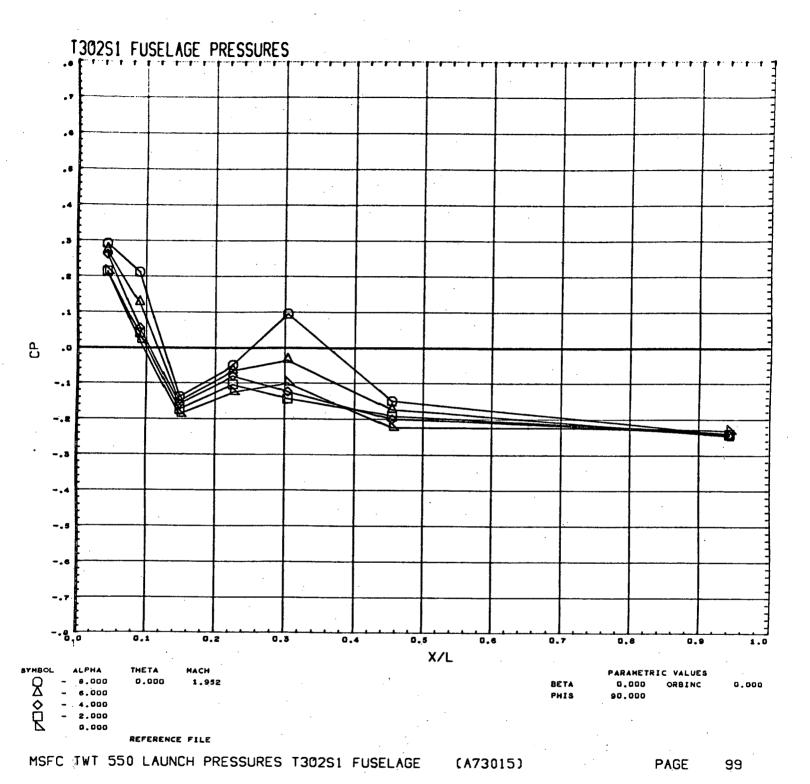
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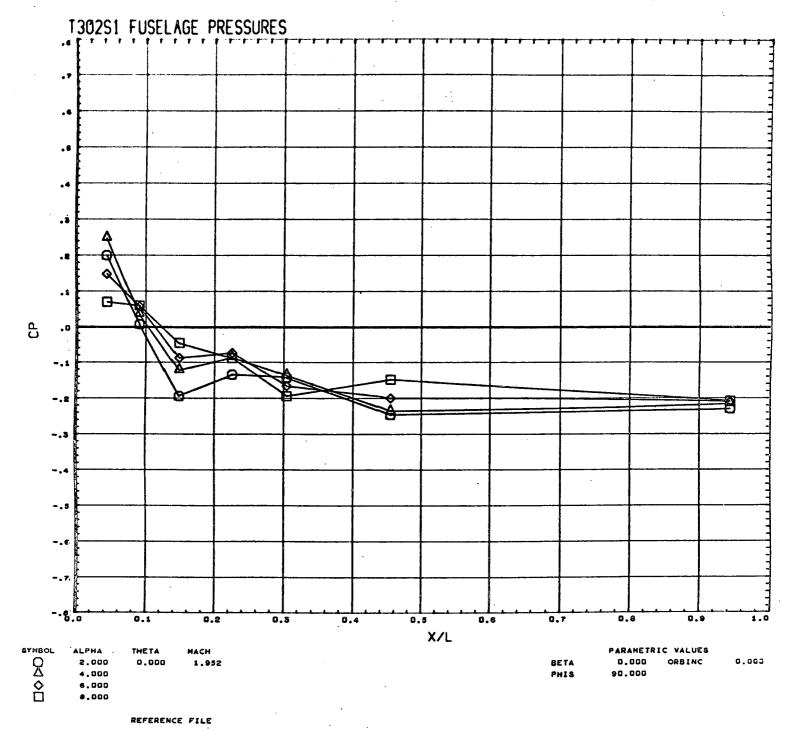


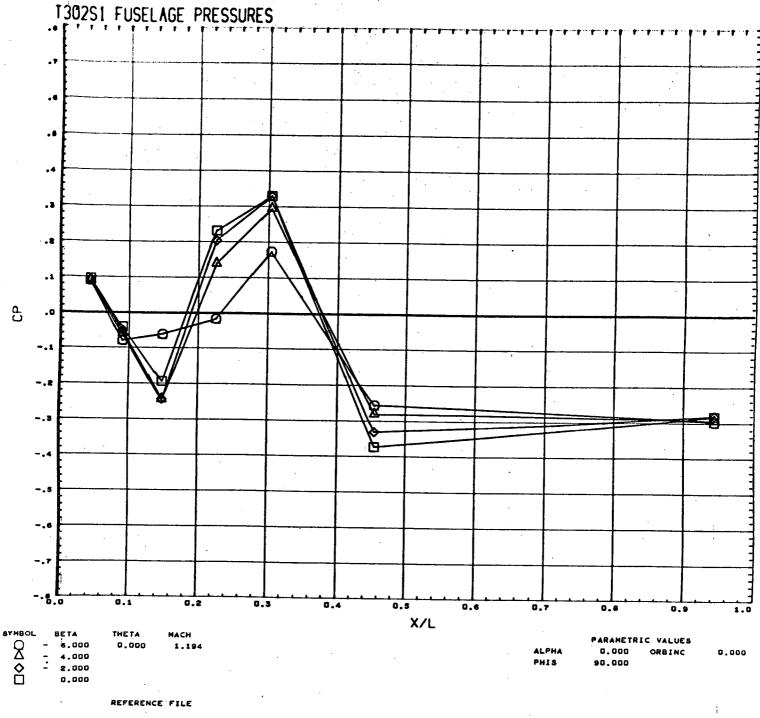
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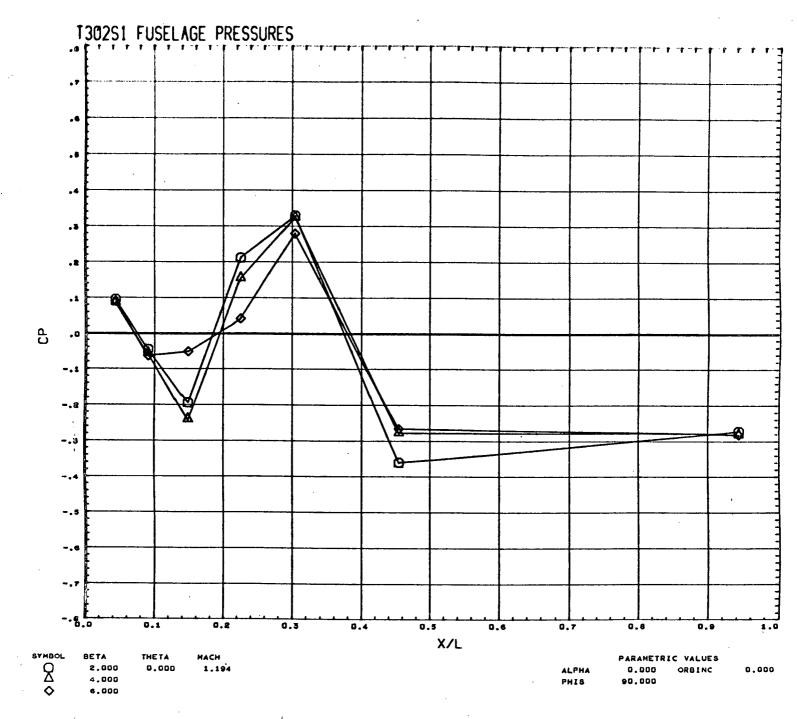






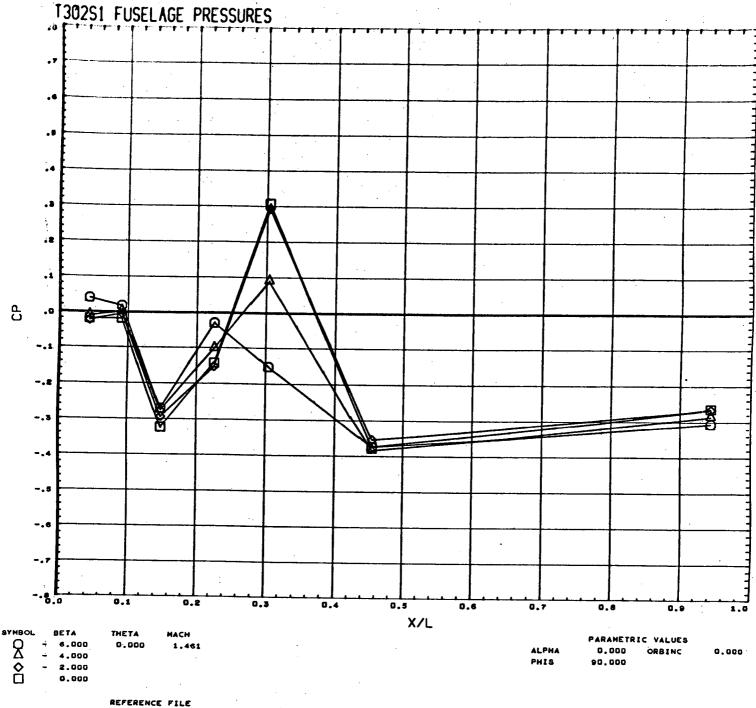


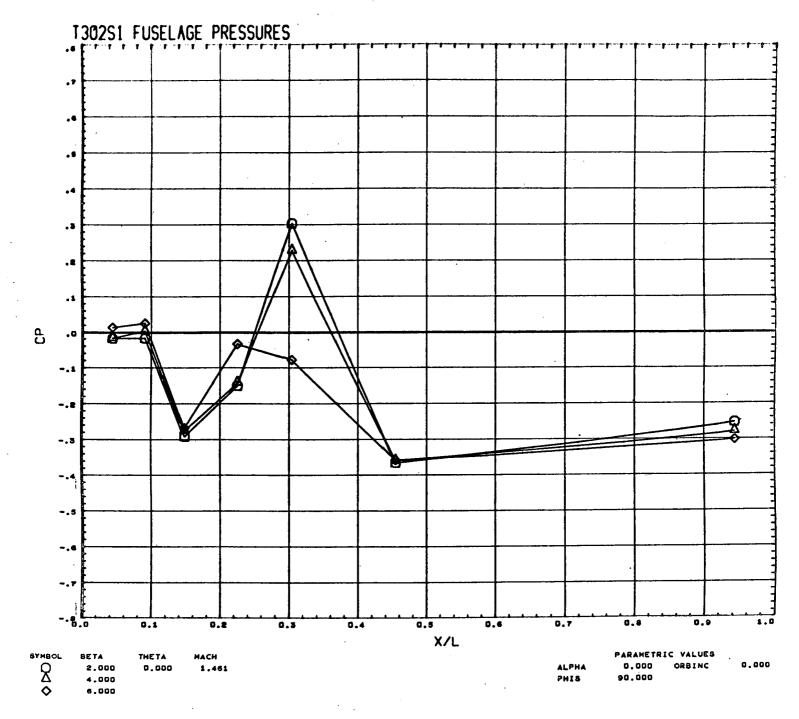
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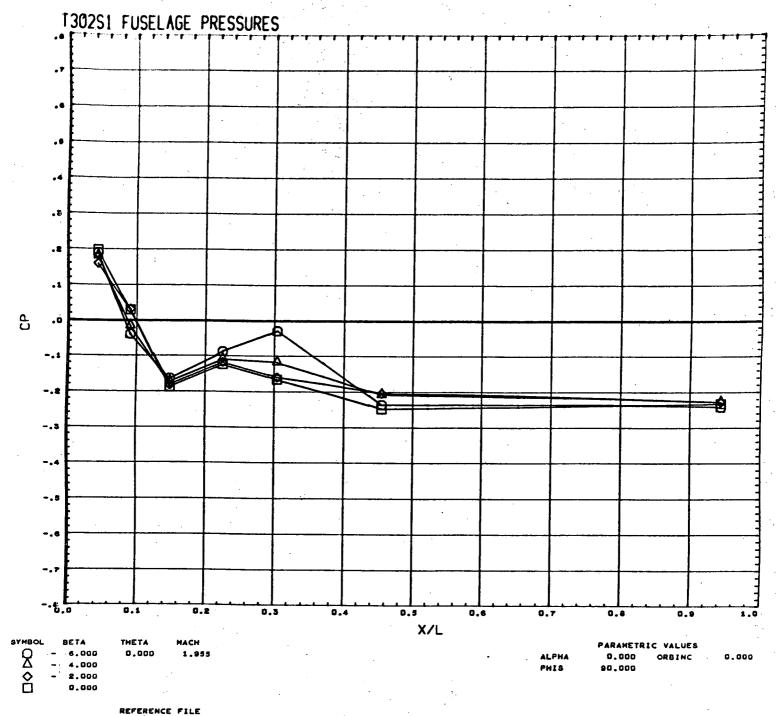
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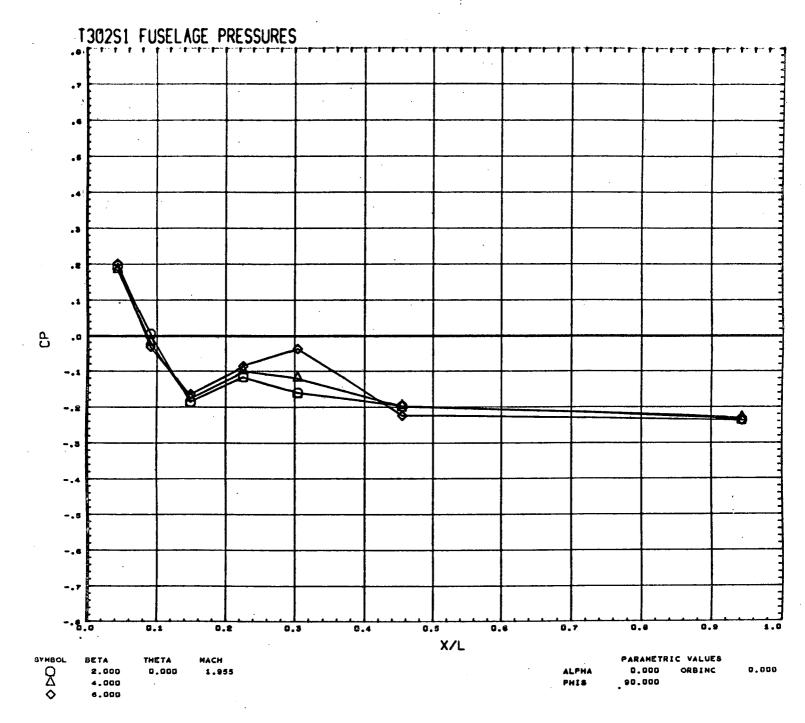
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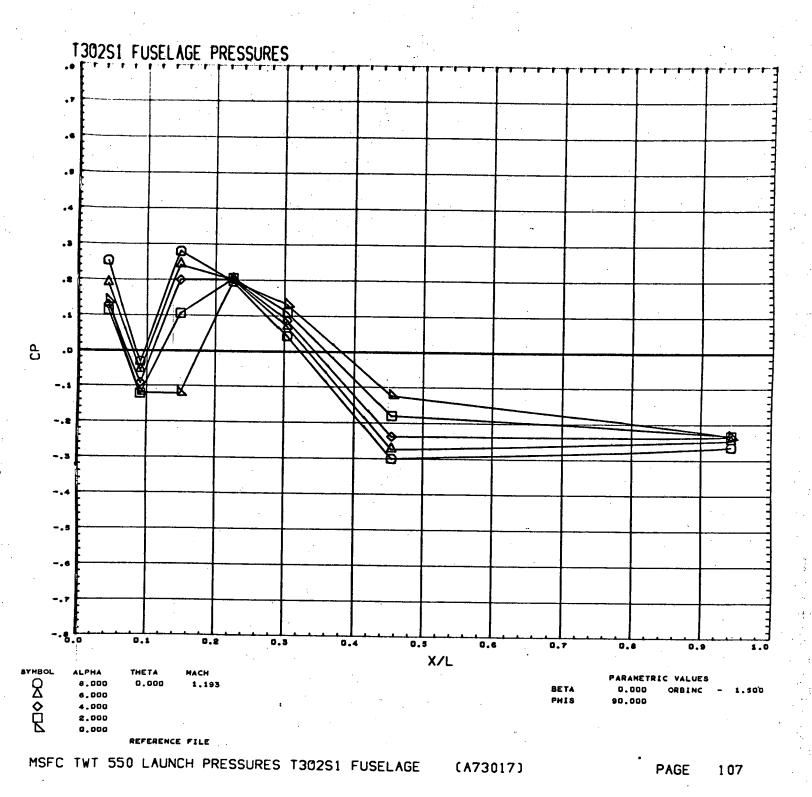


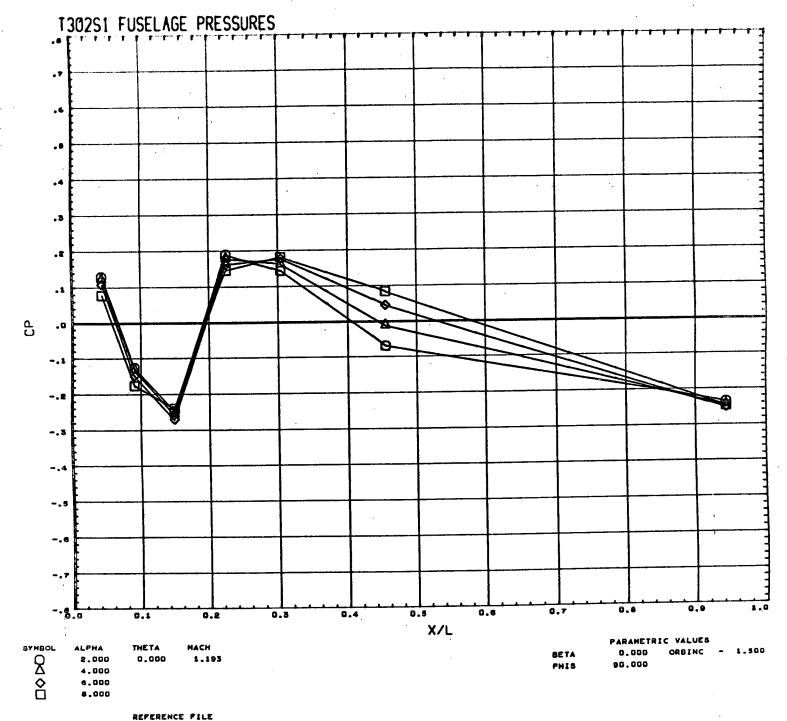
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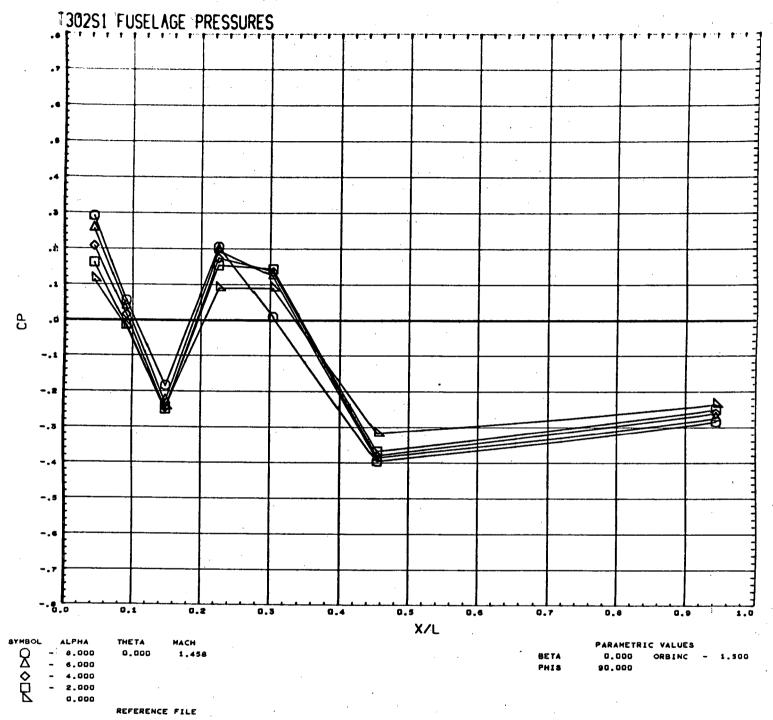
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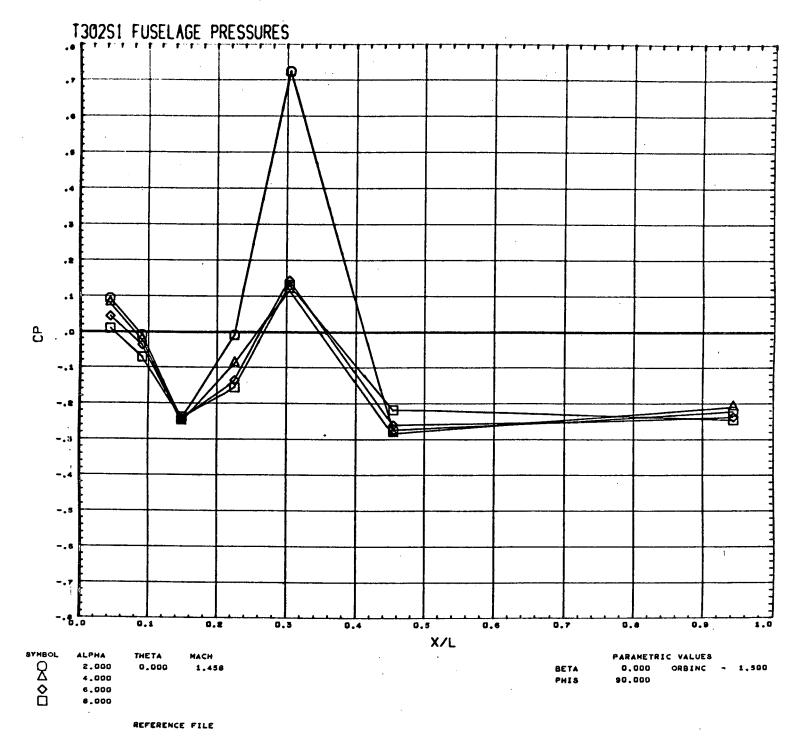


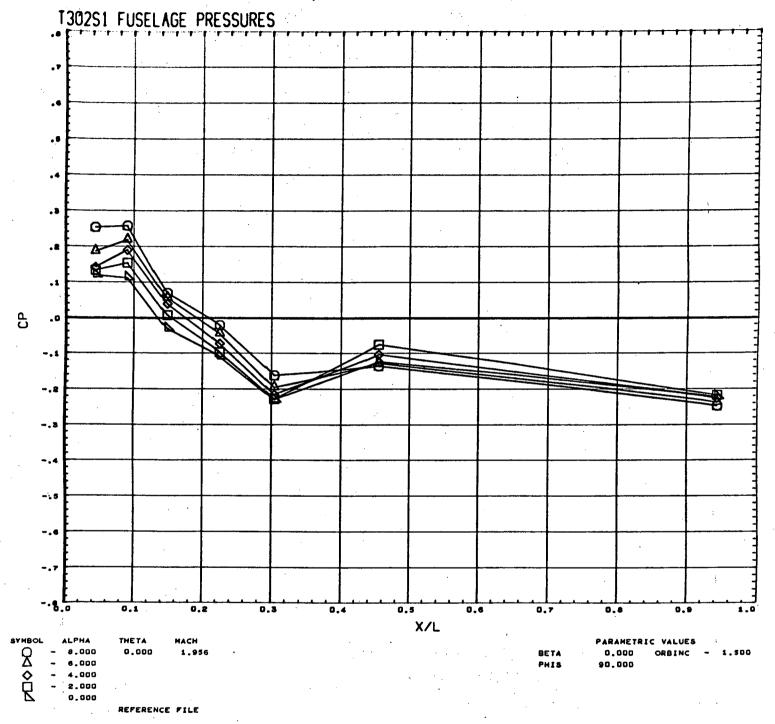
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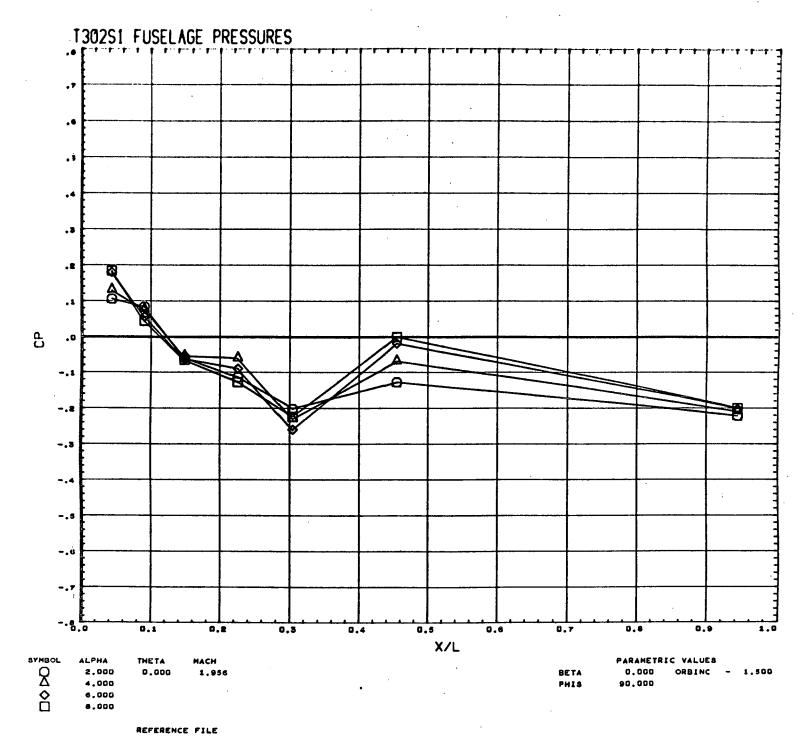


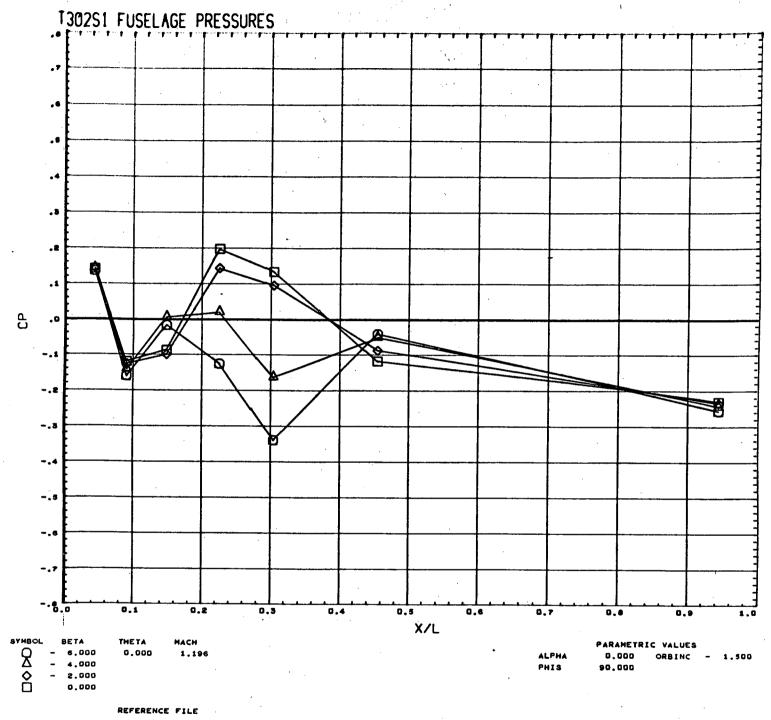






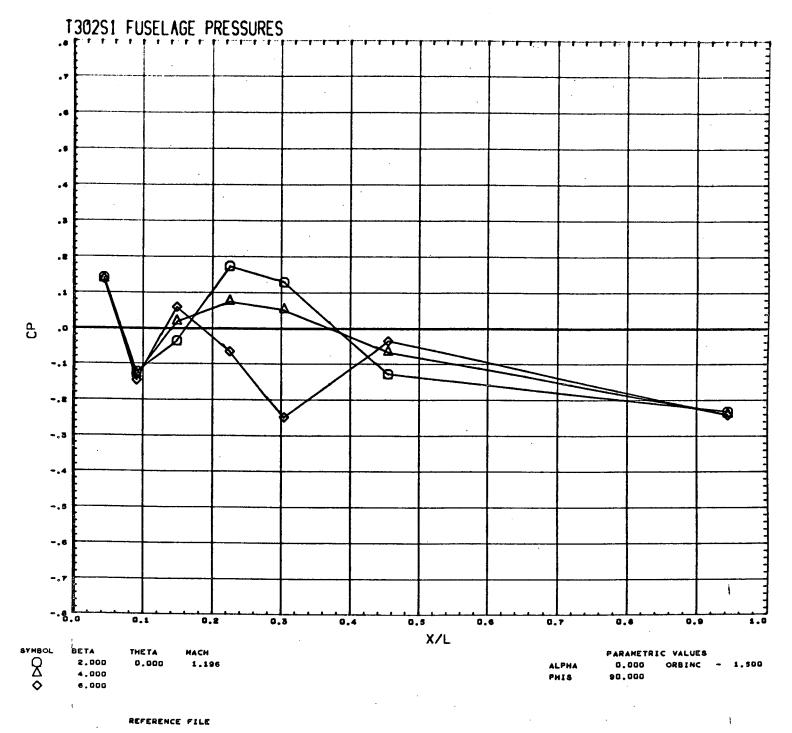




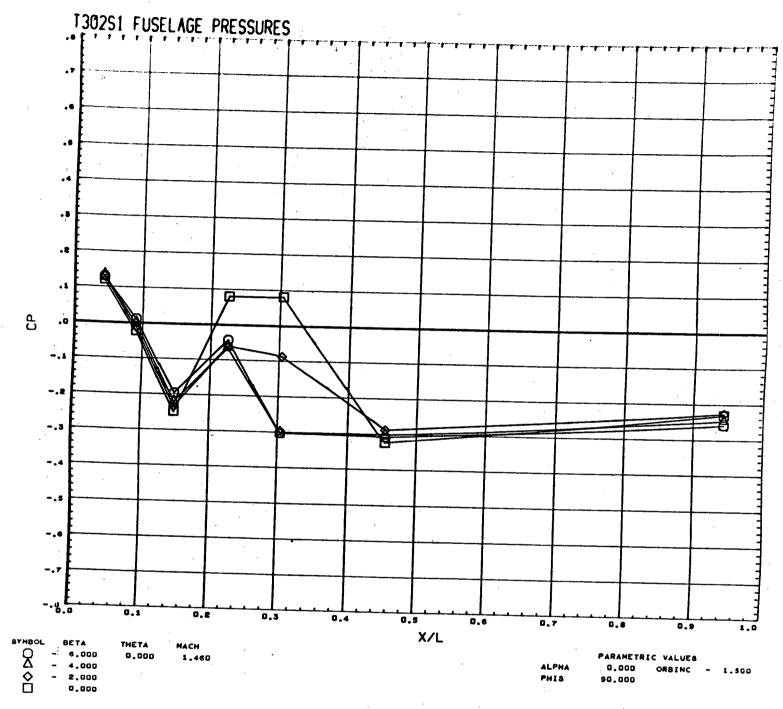


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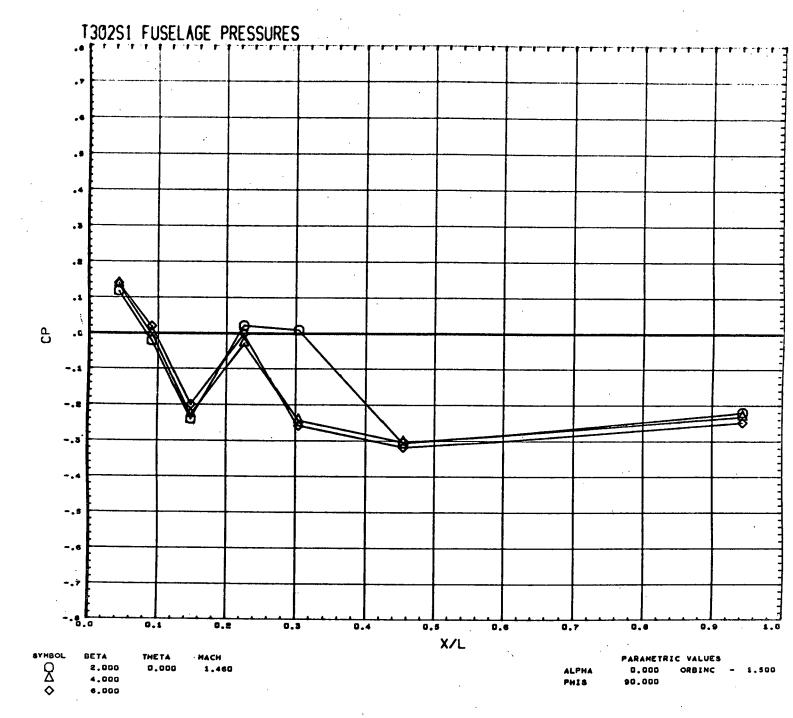


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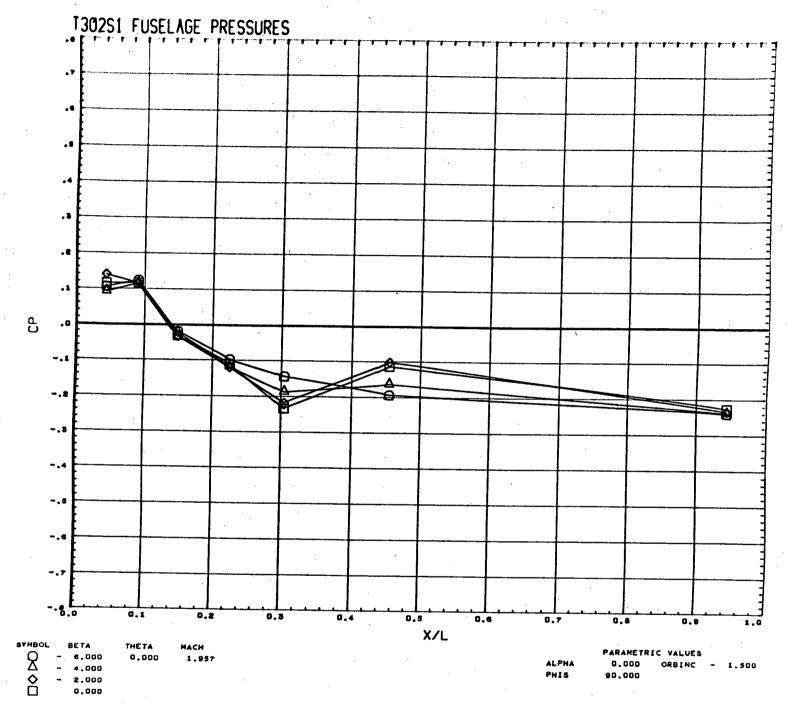
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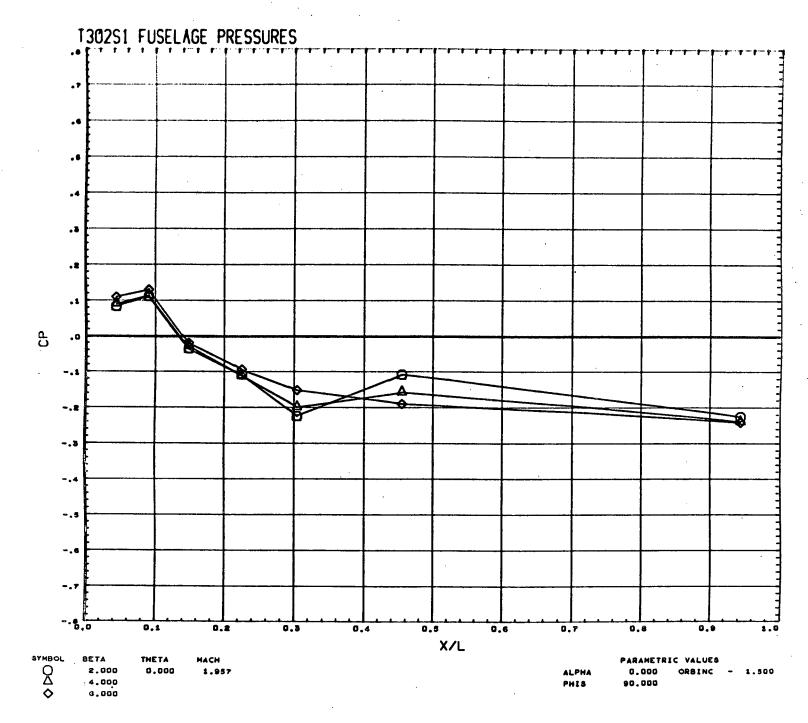
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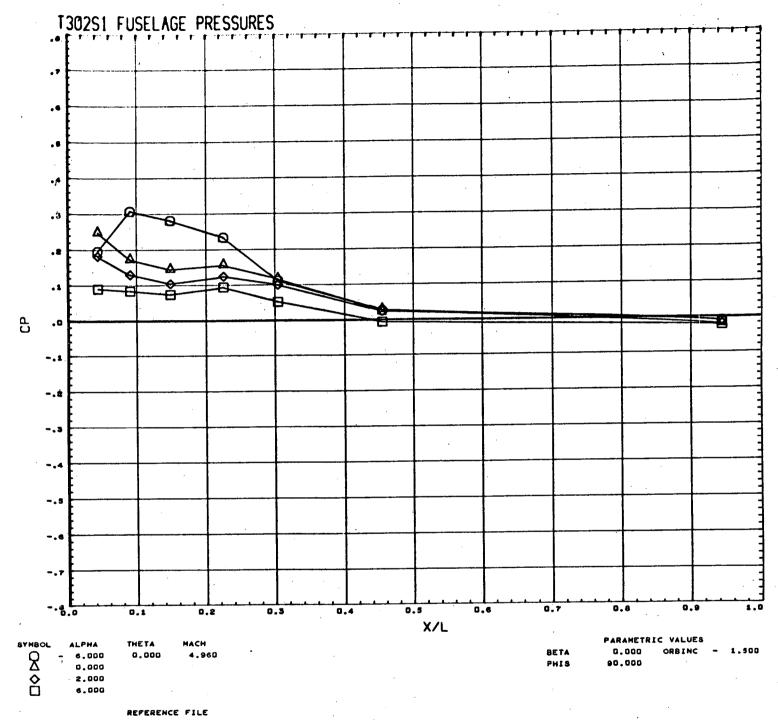


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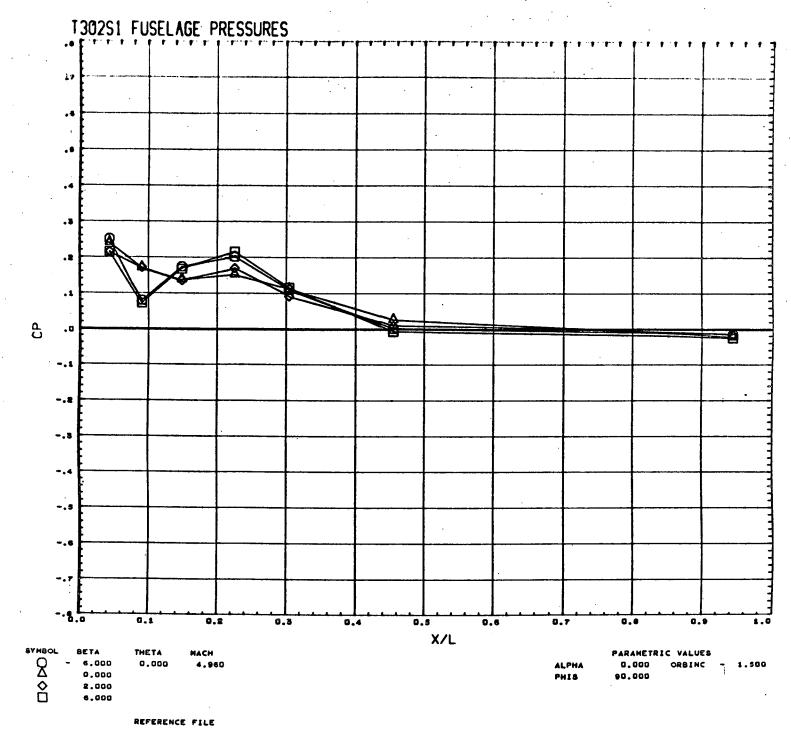
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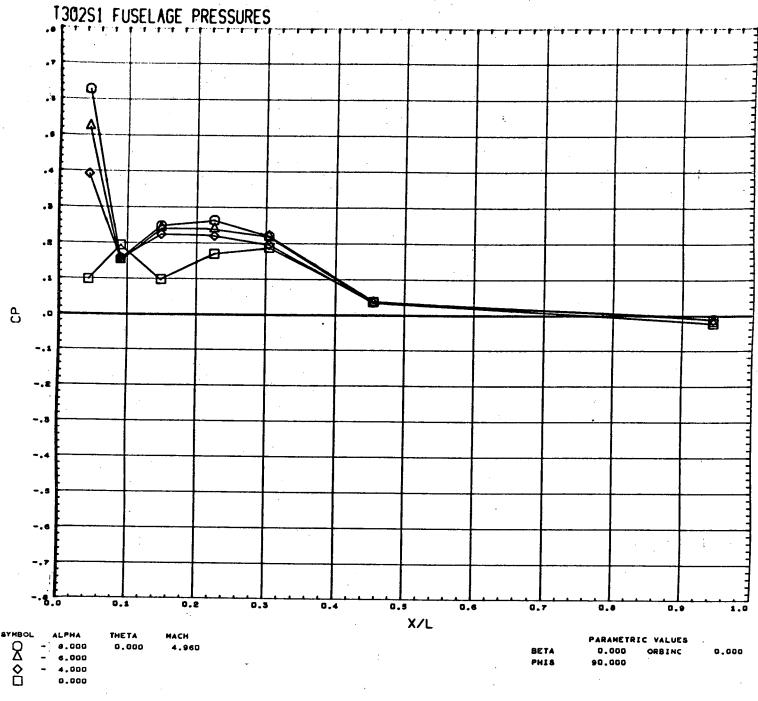
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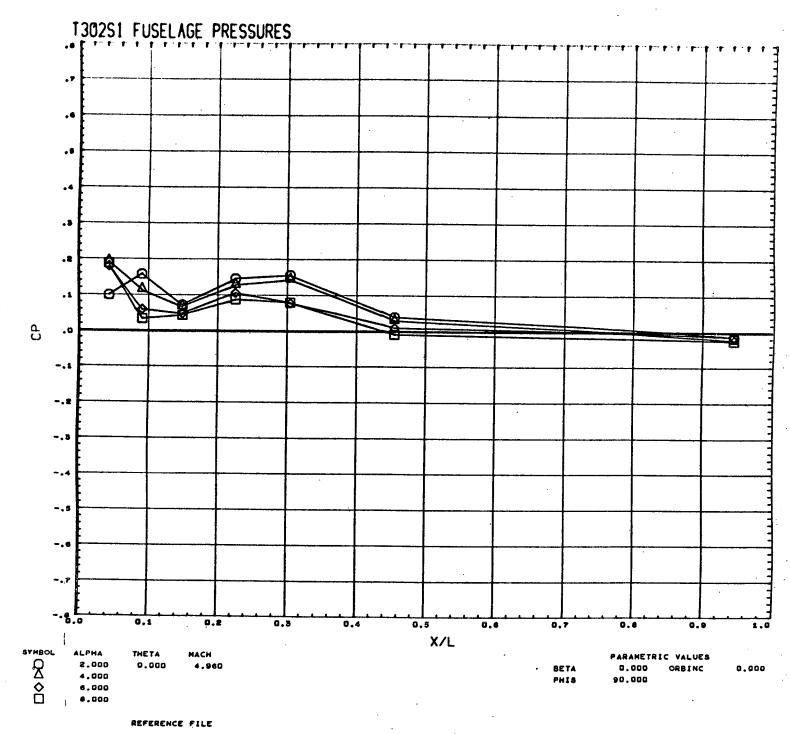
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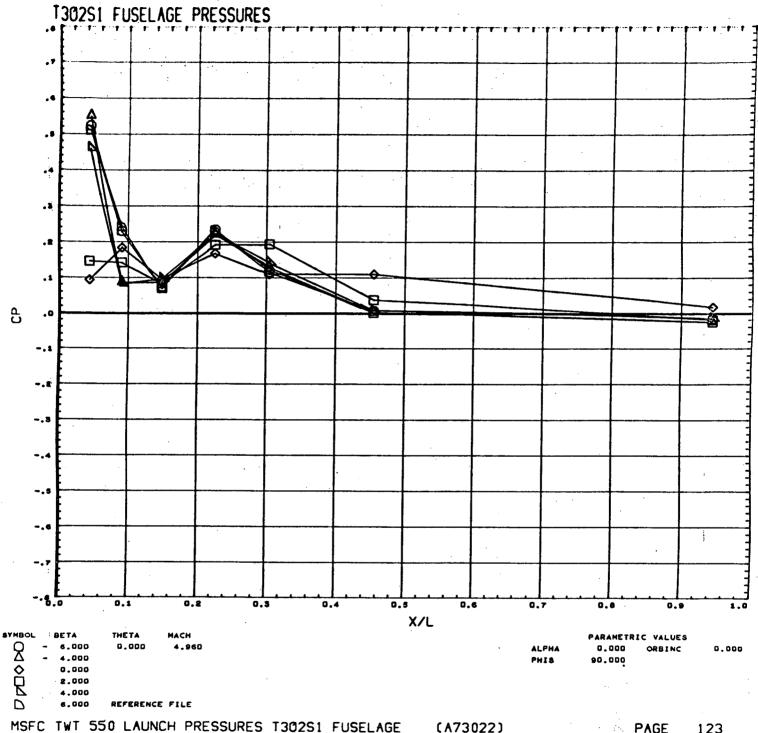
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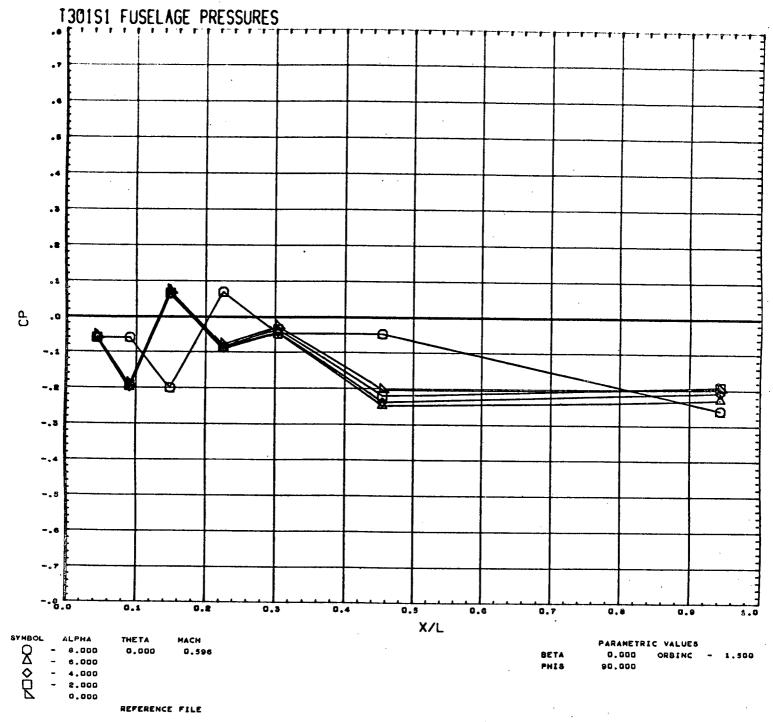
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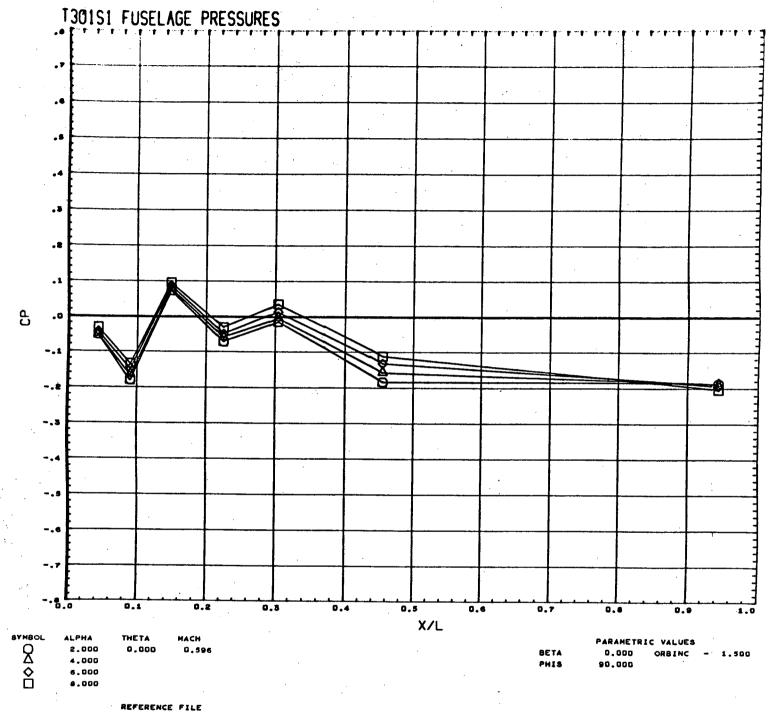
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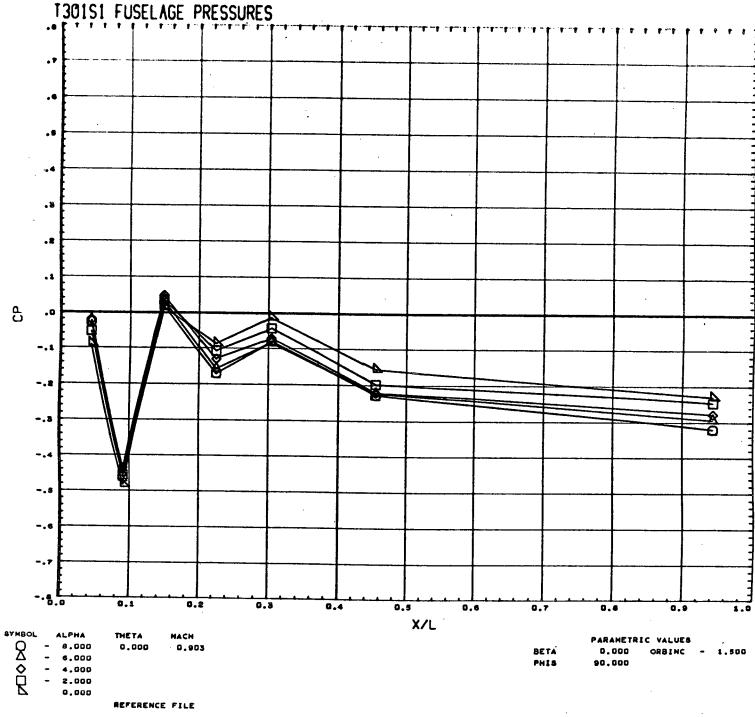


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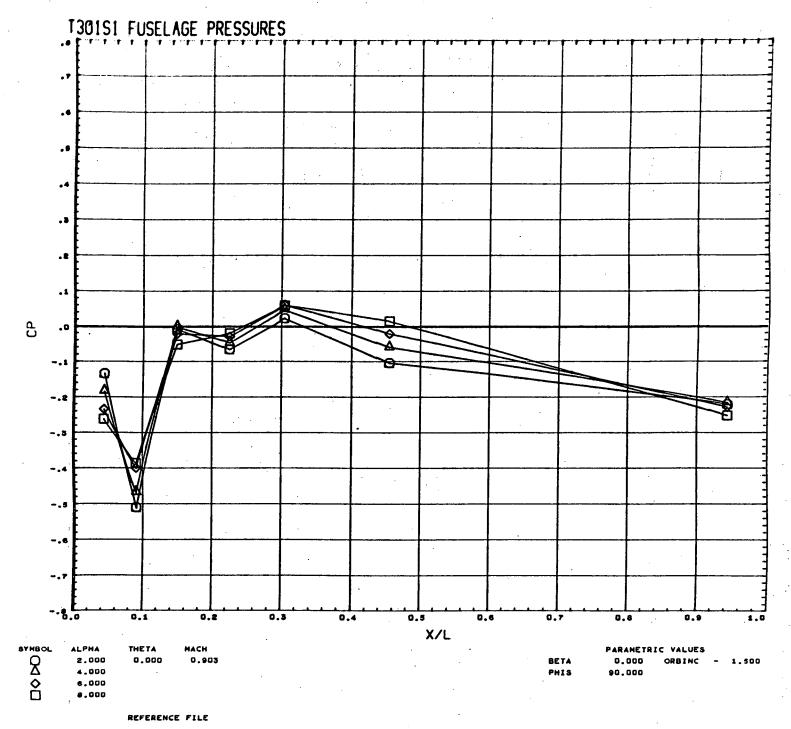


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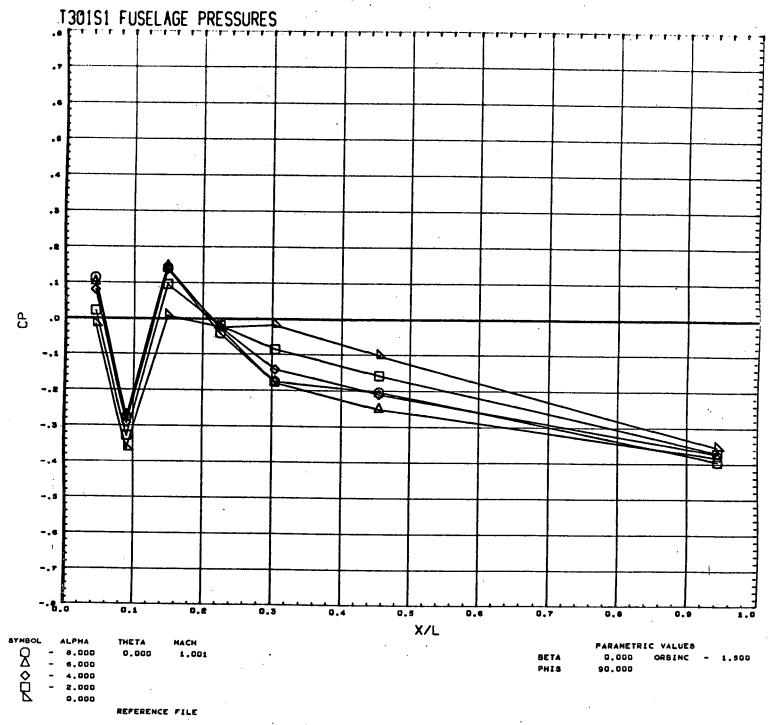


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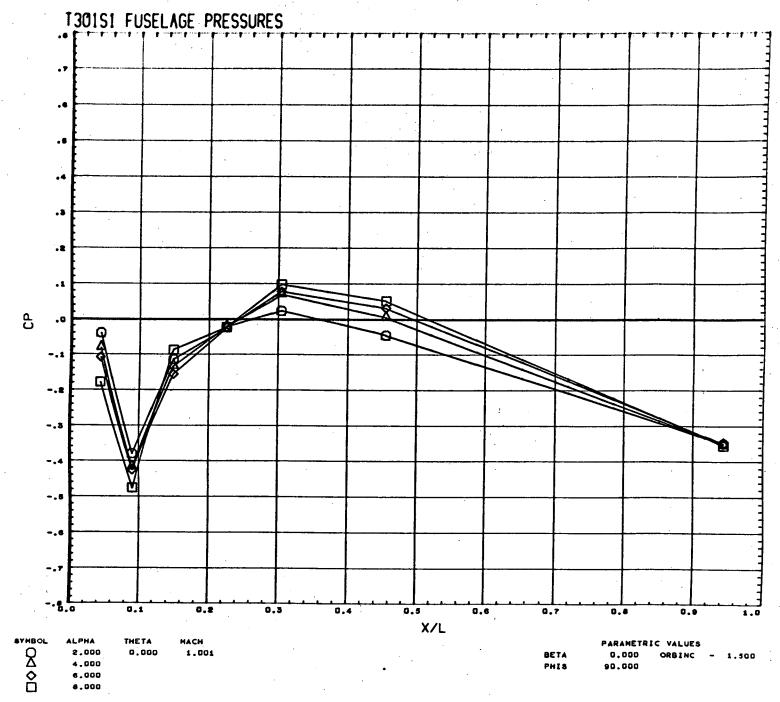
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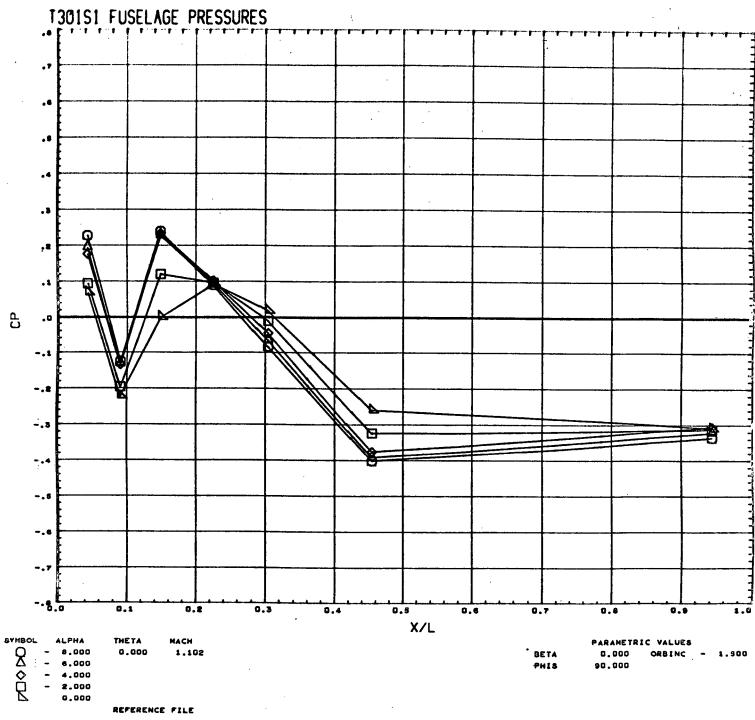


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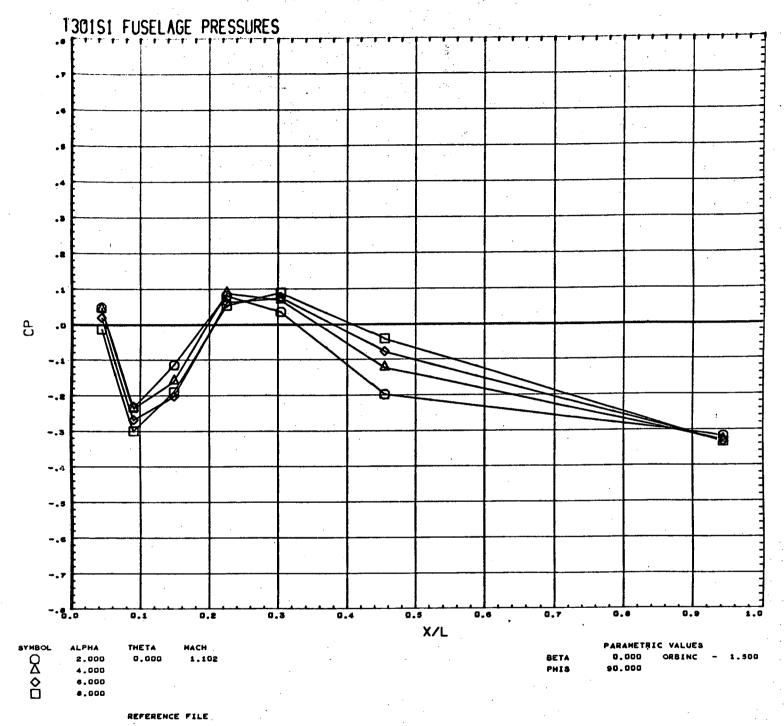


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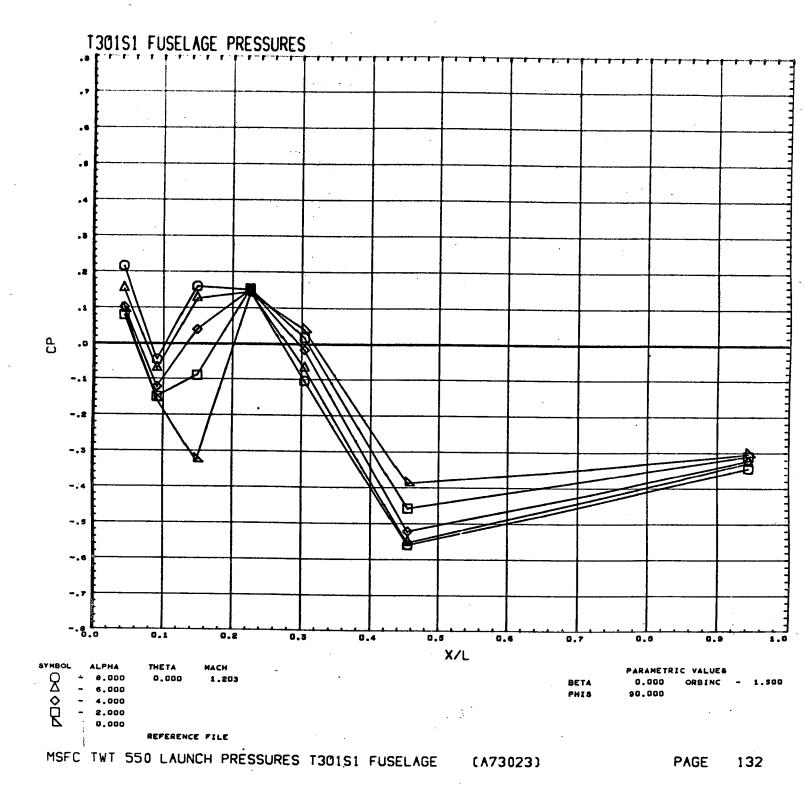
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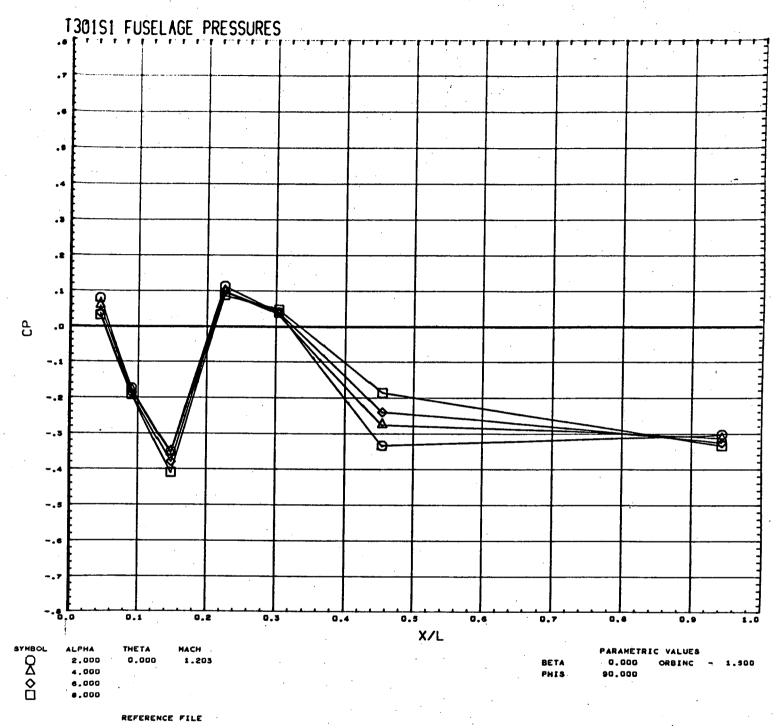


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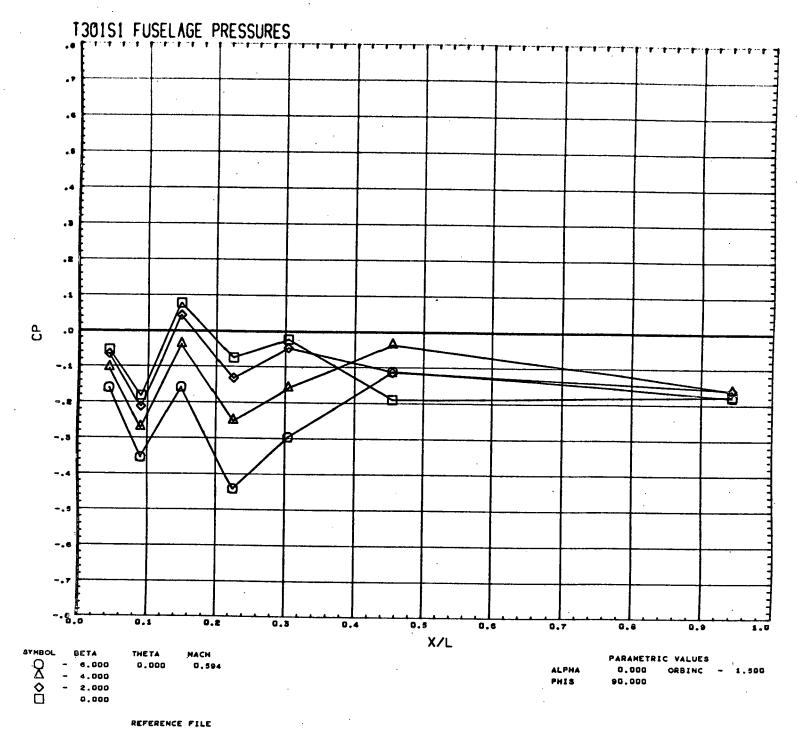
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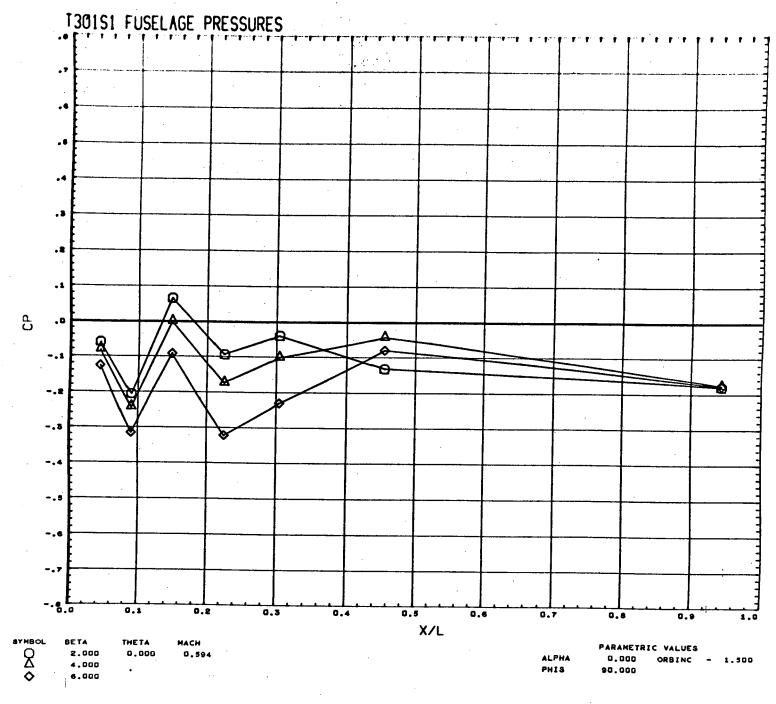


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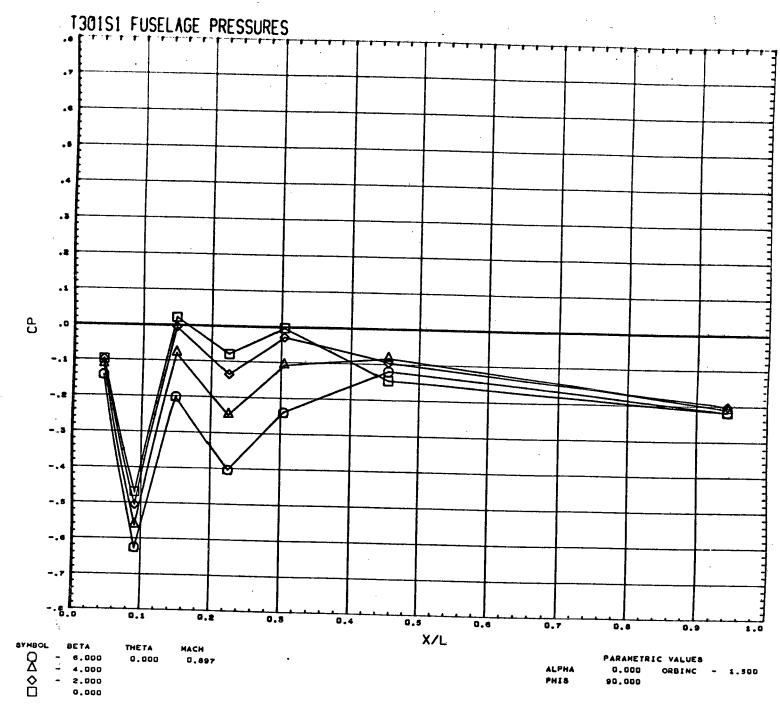


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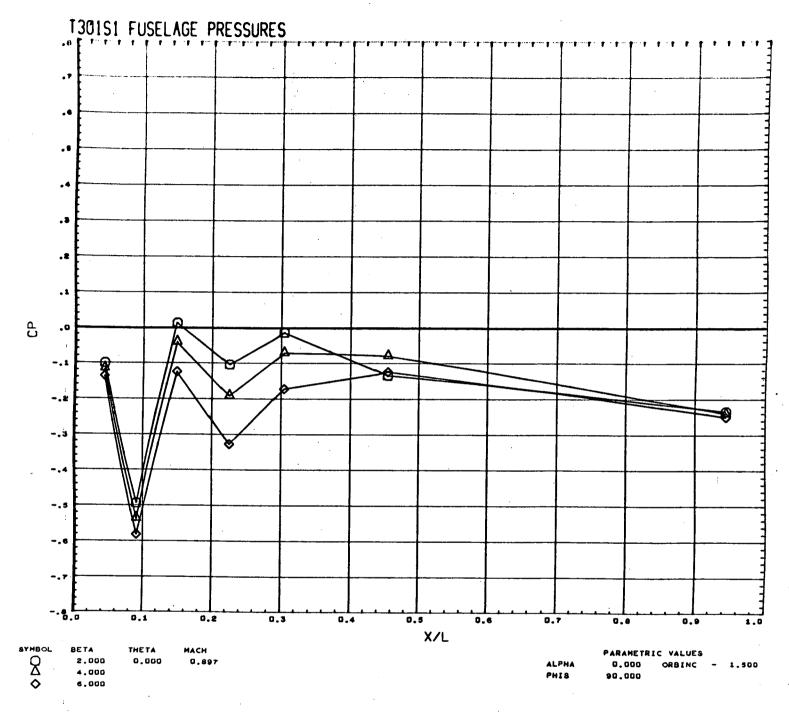


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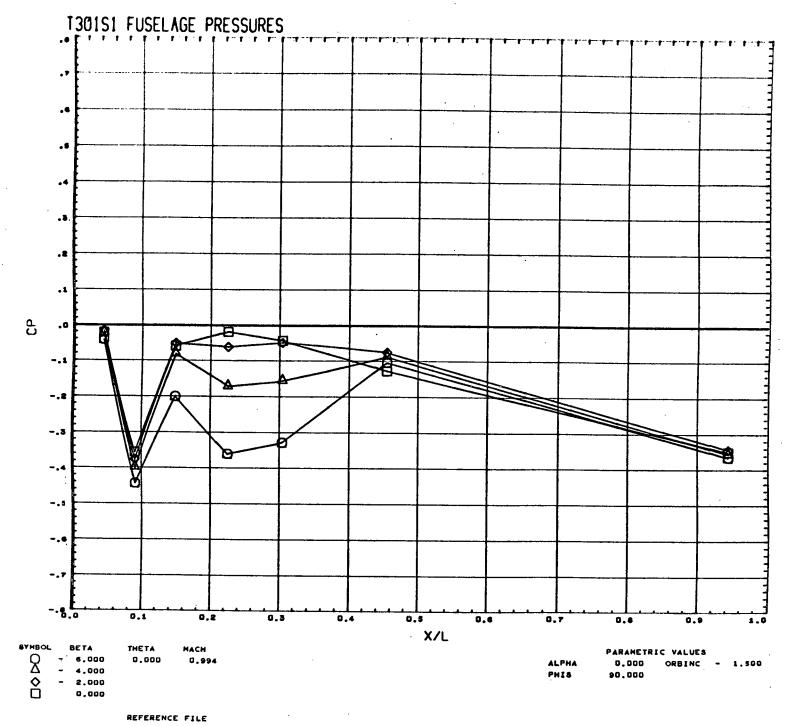
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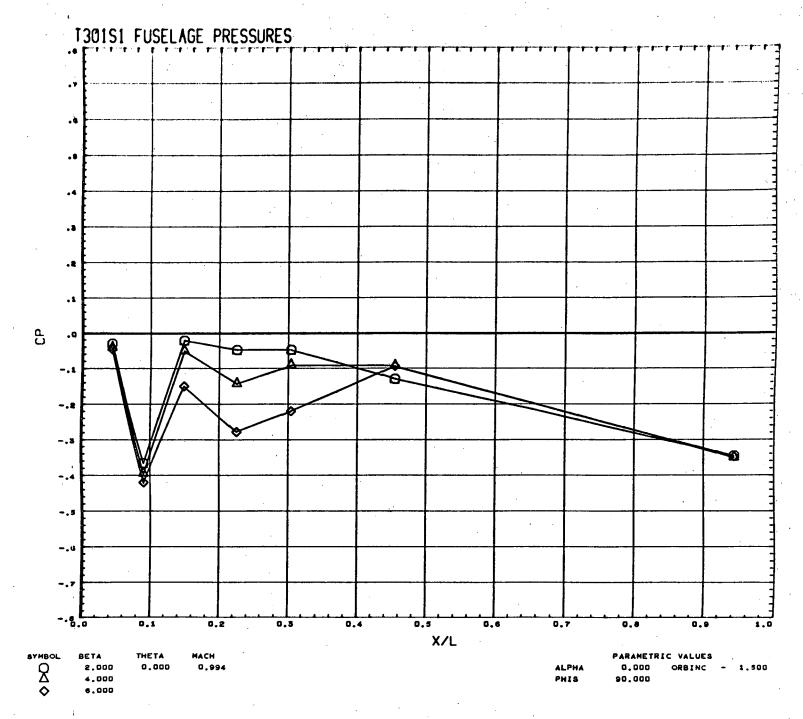
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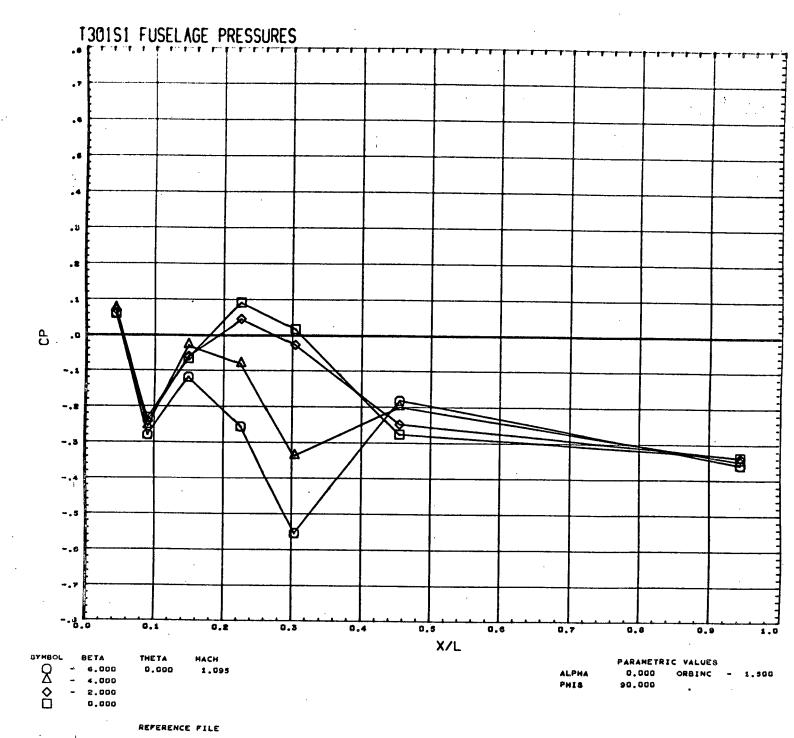


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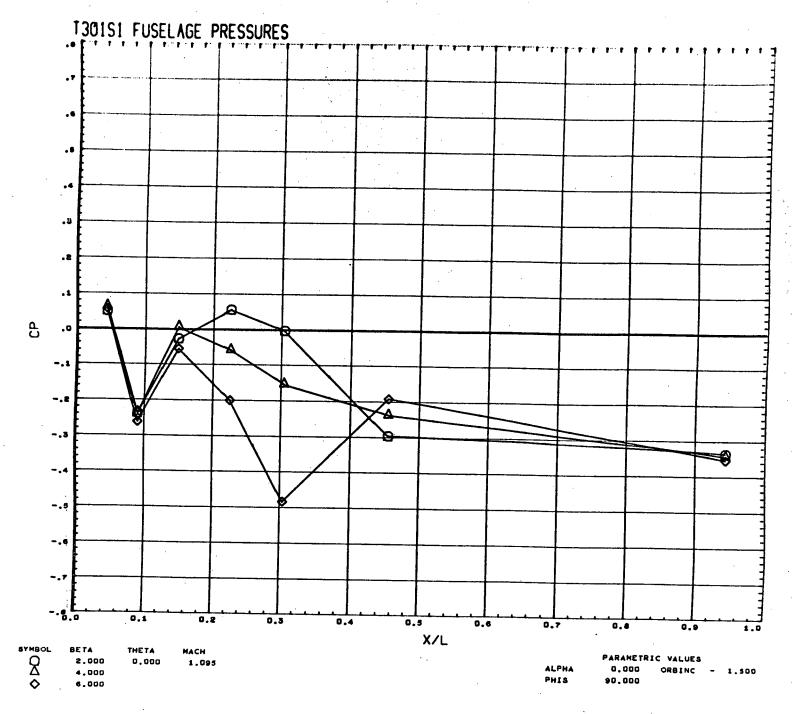


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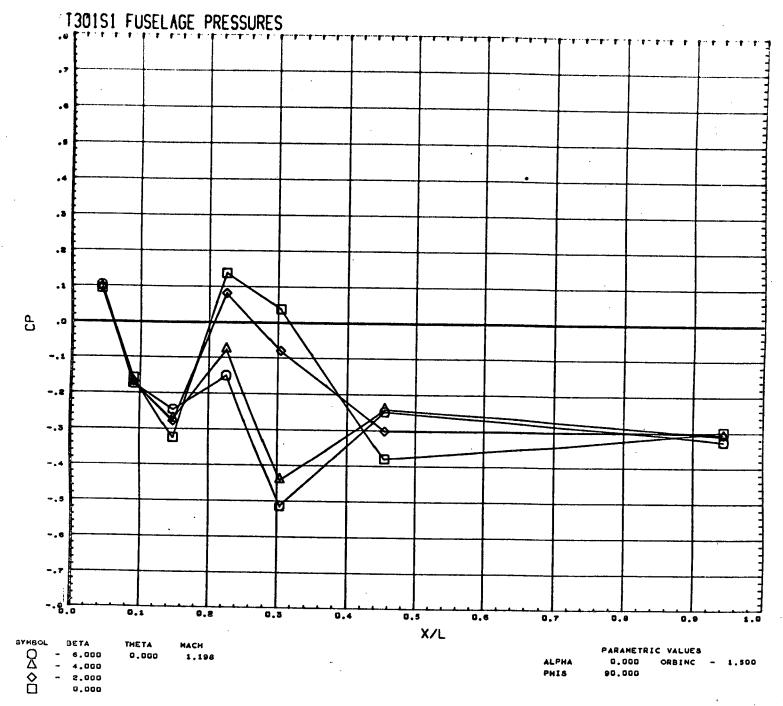
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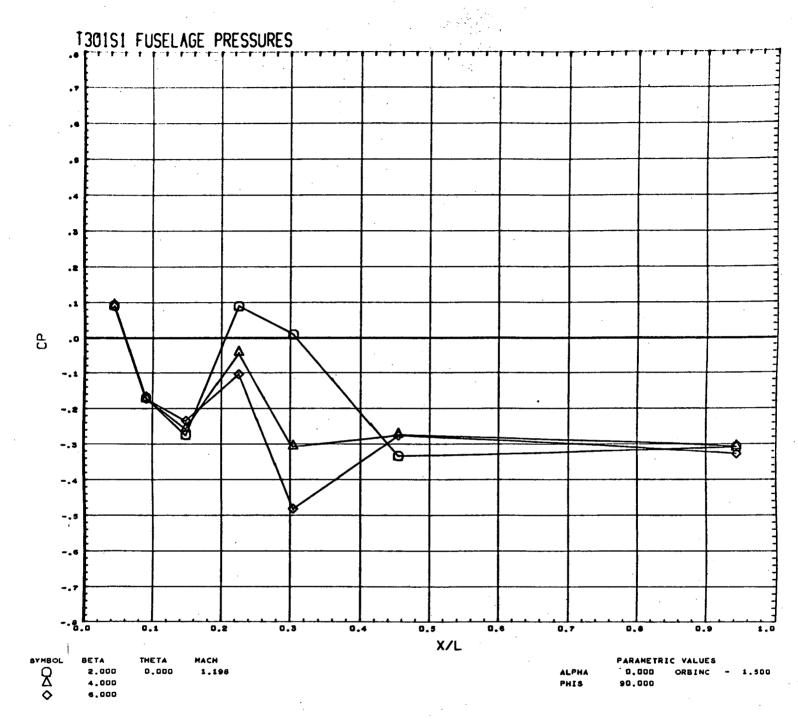


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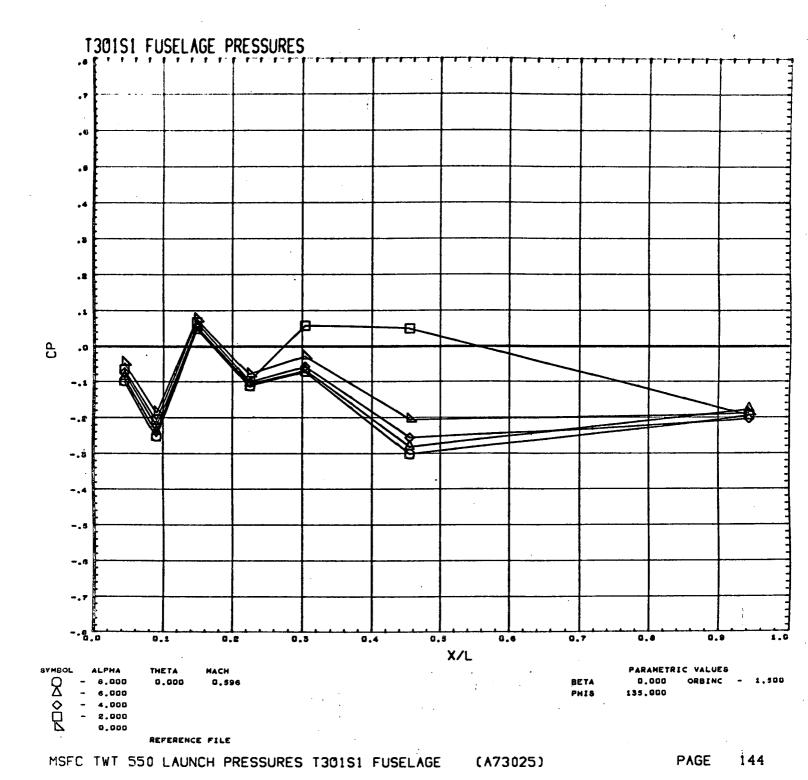
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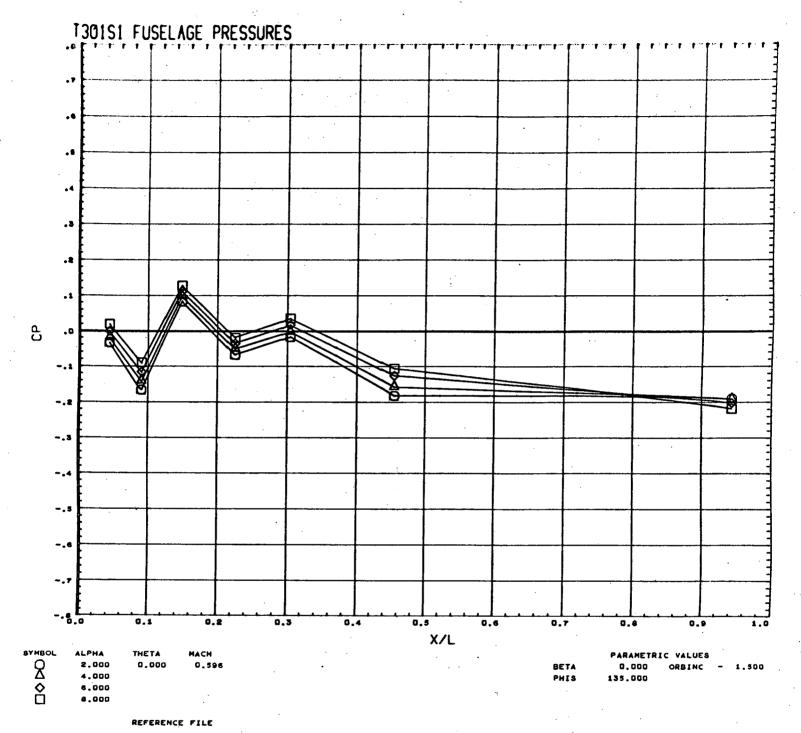
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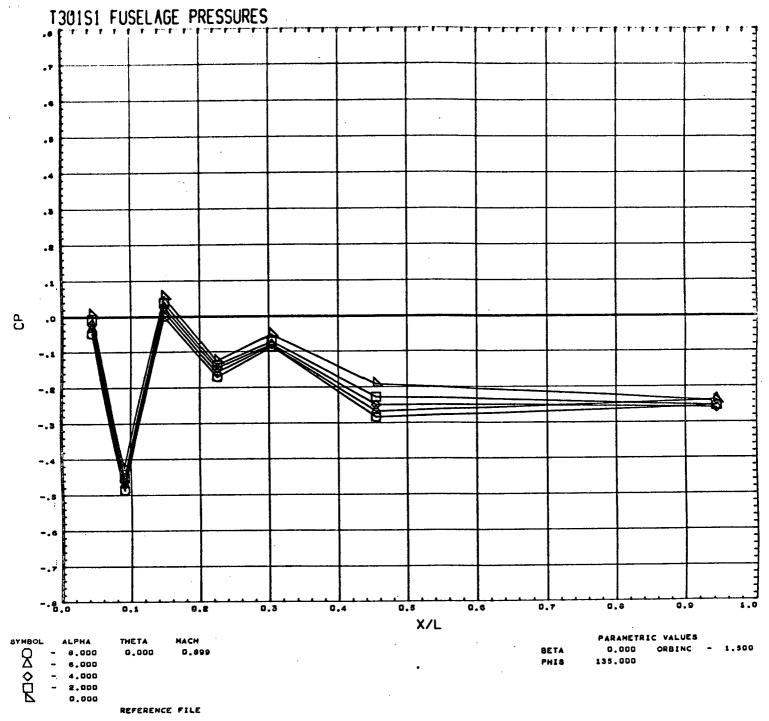
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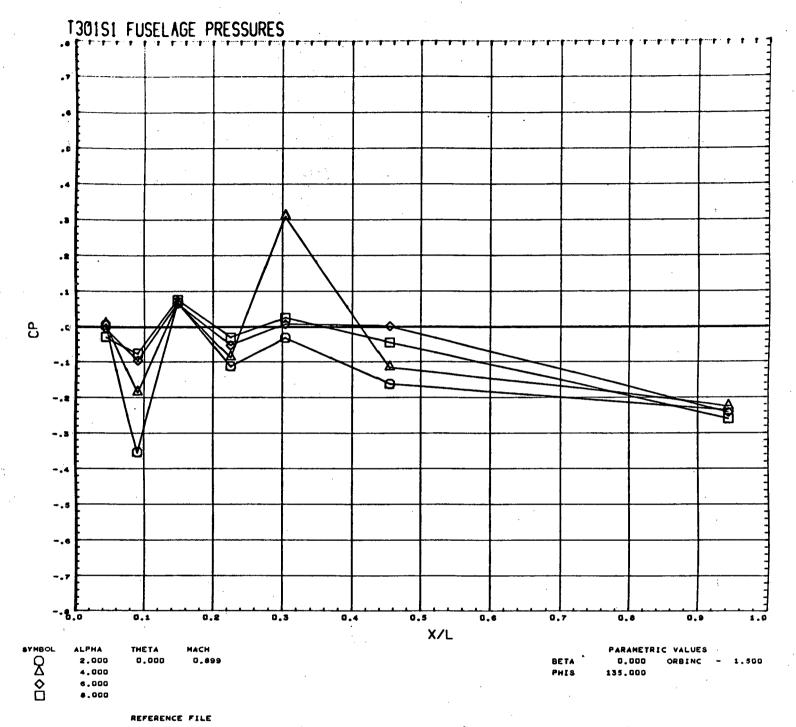




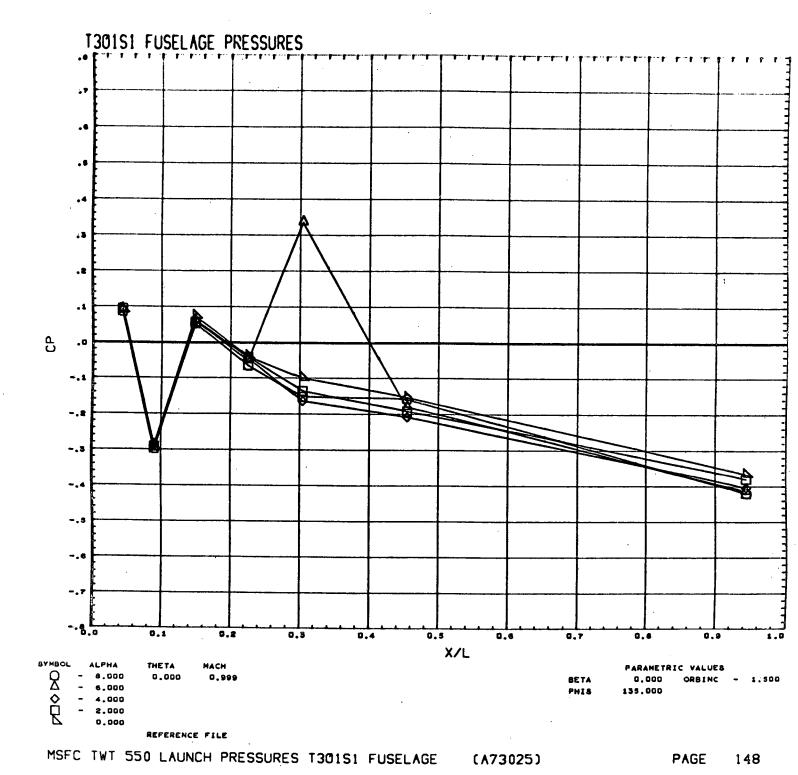
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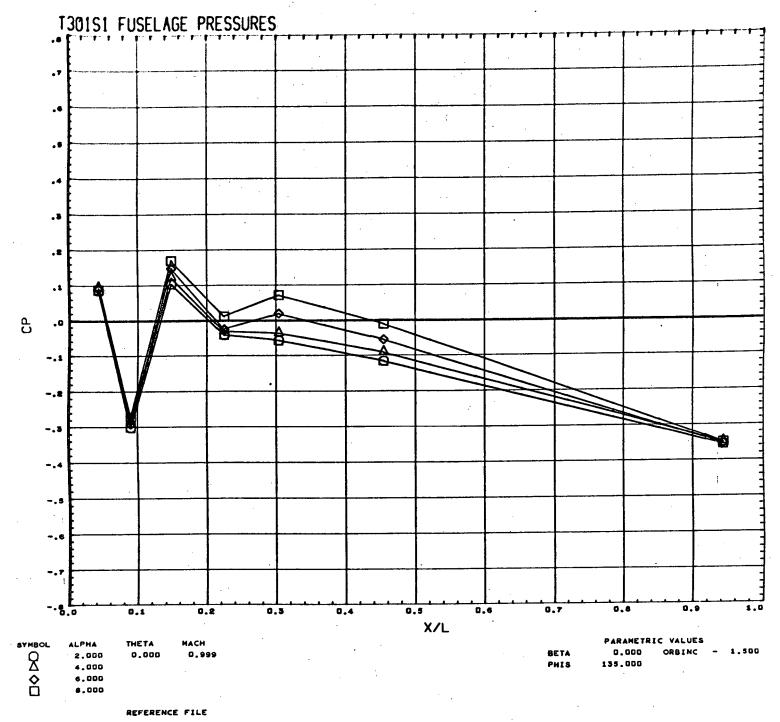


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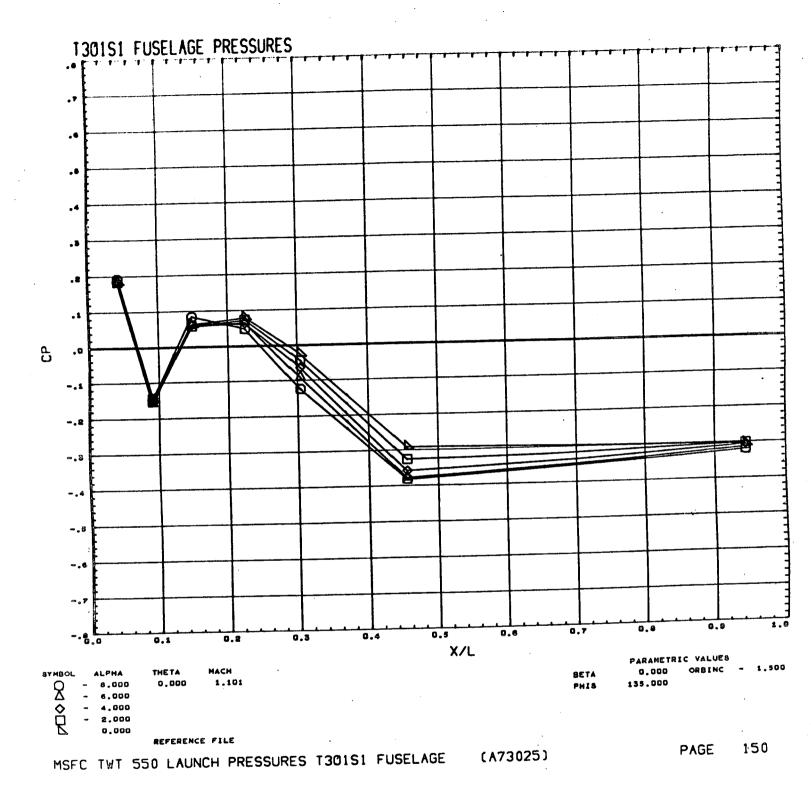
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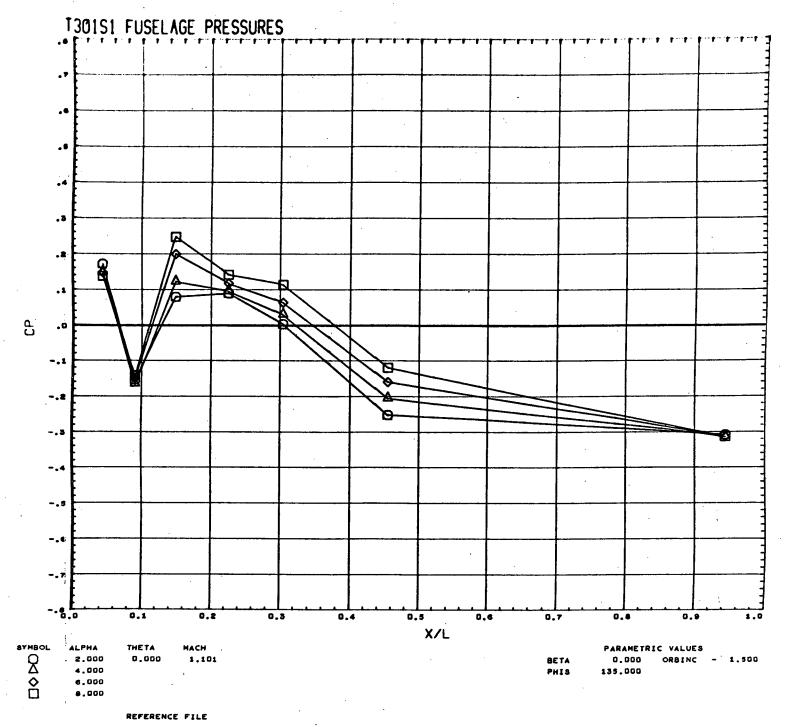




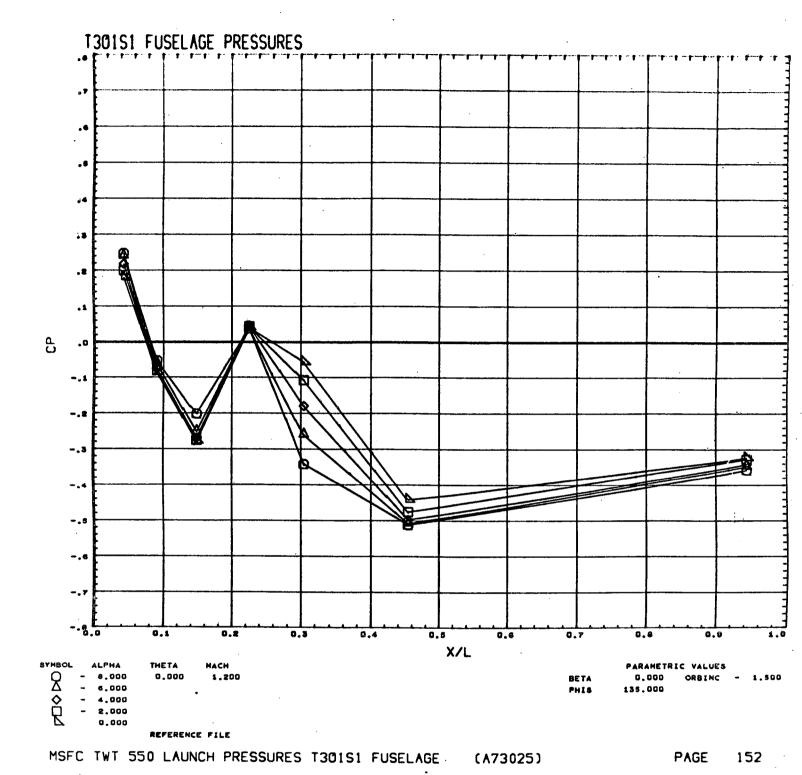
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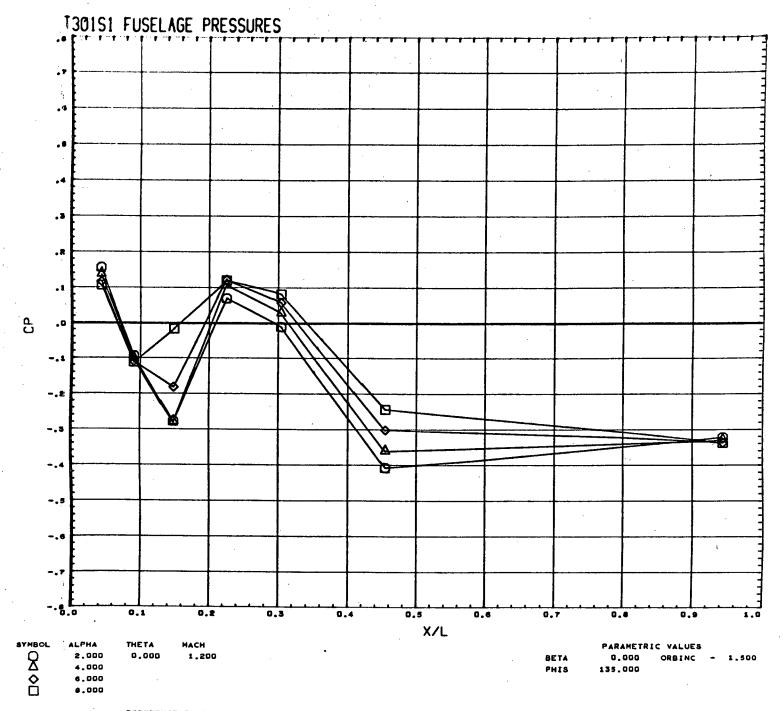




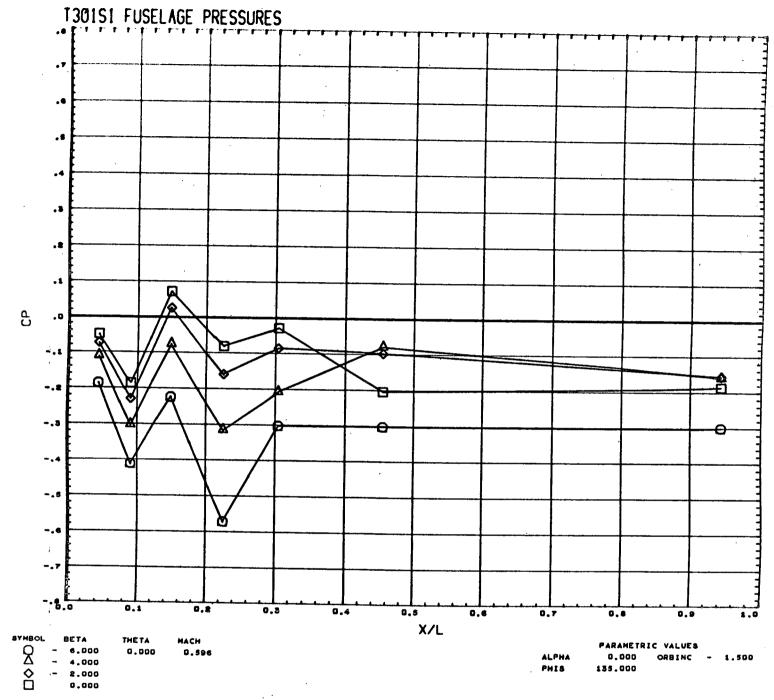


PAGE _ 151

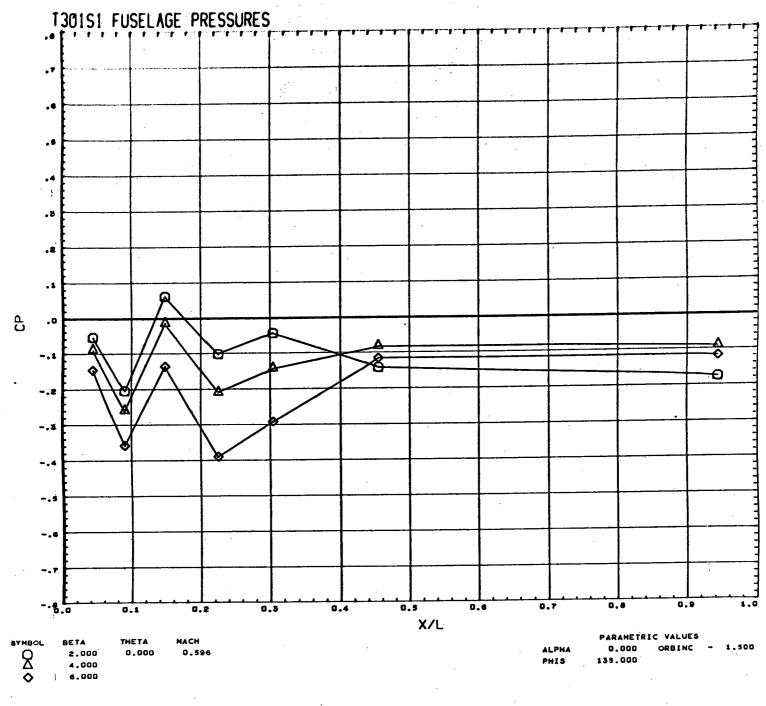




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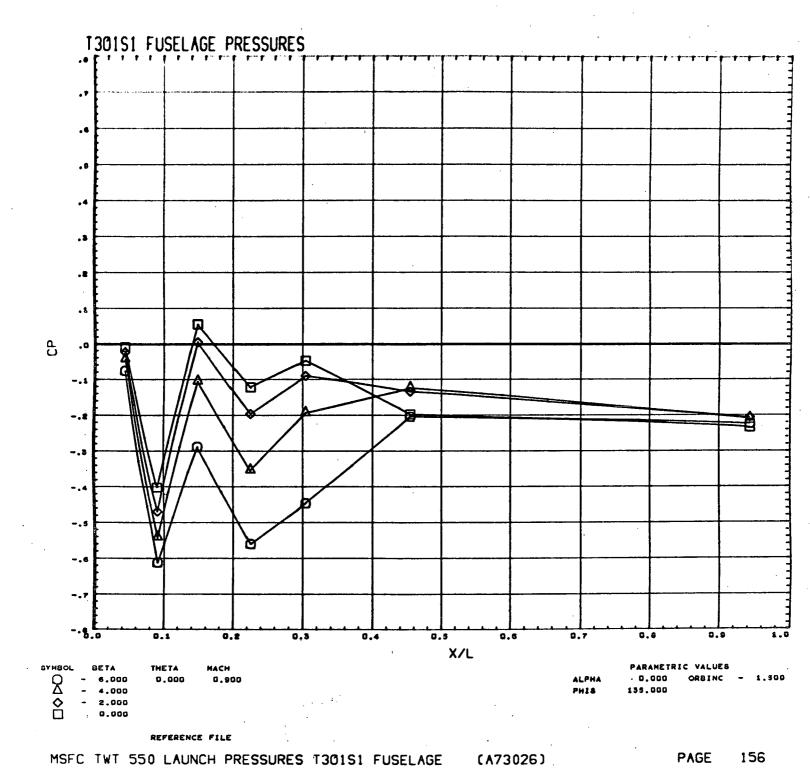
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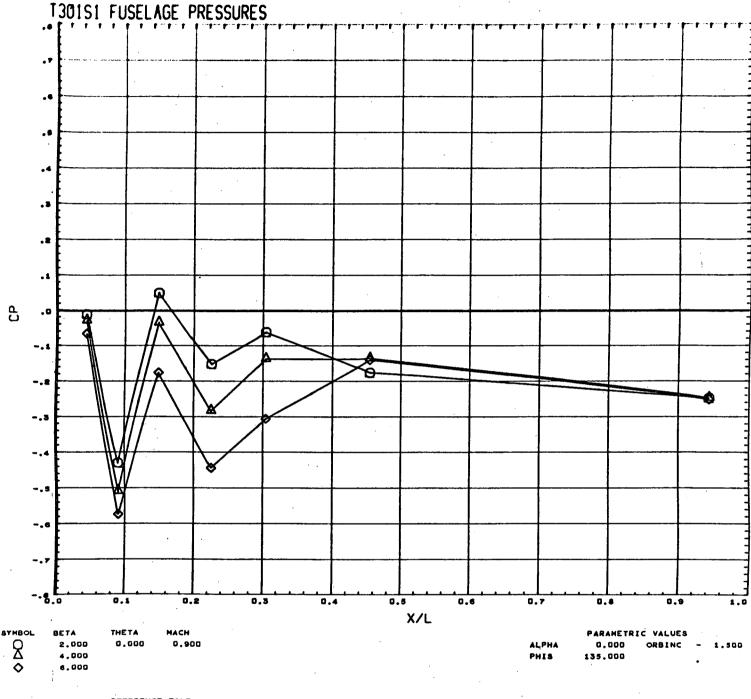


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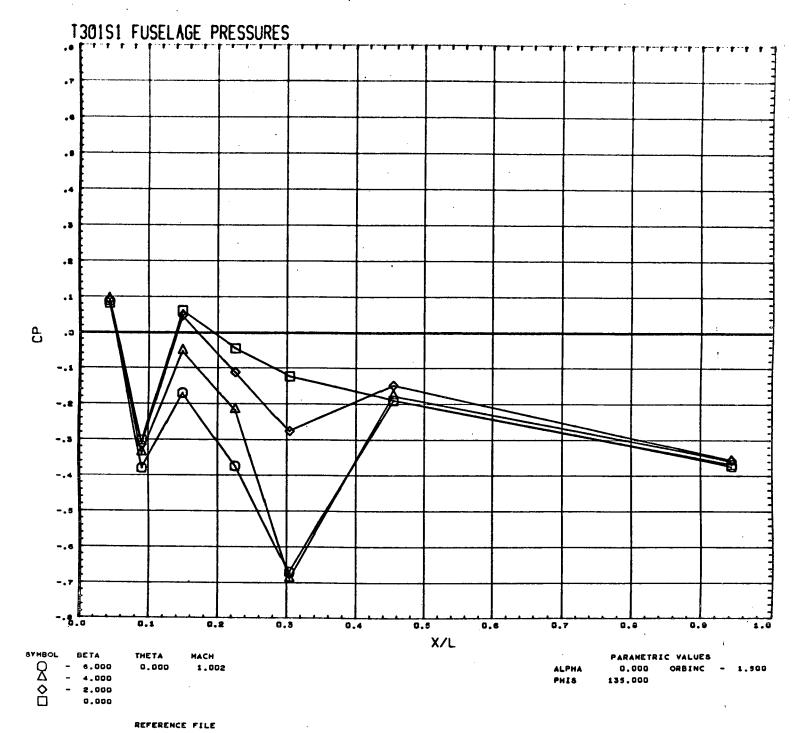
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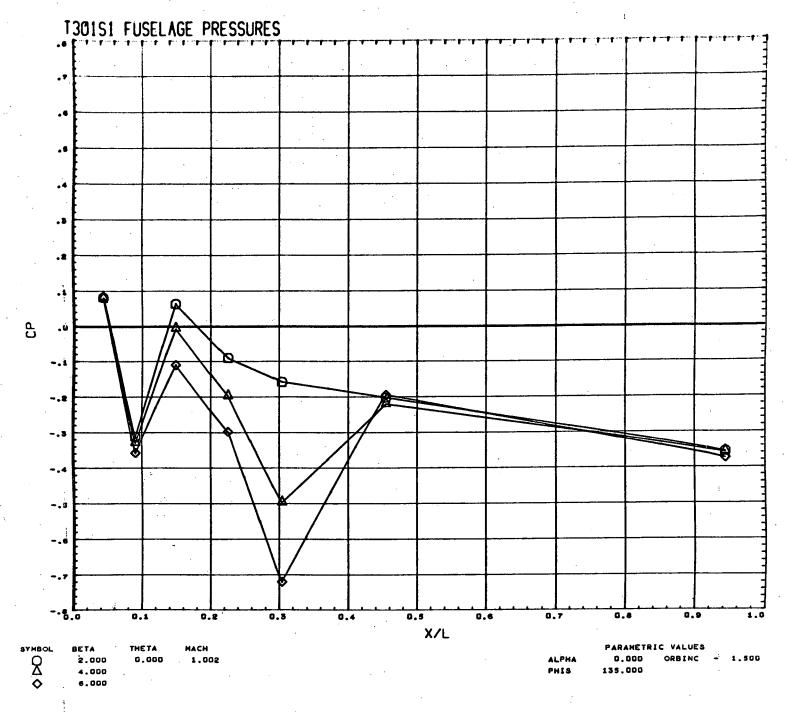




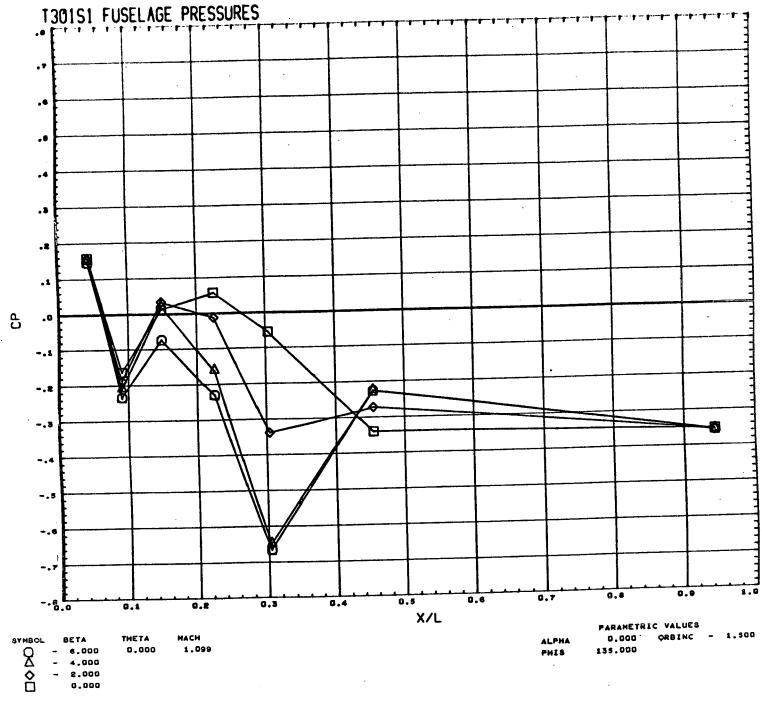
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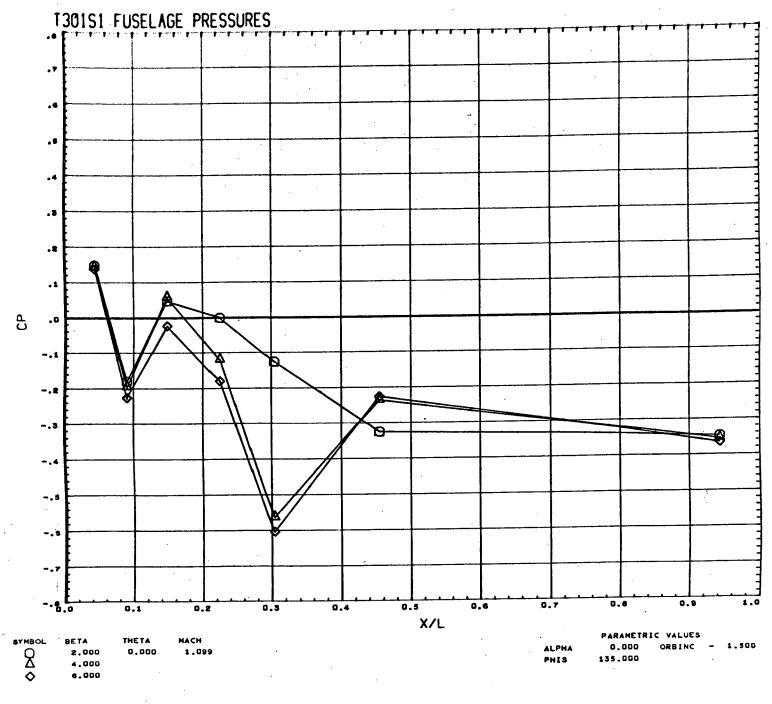


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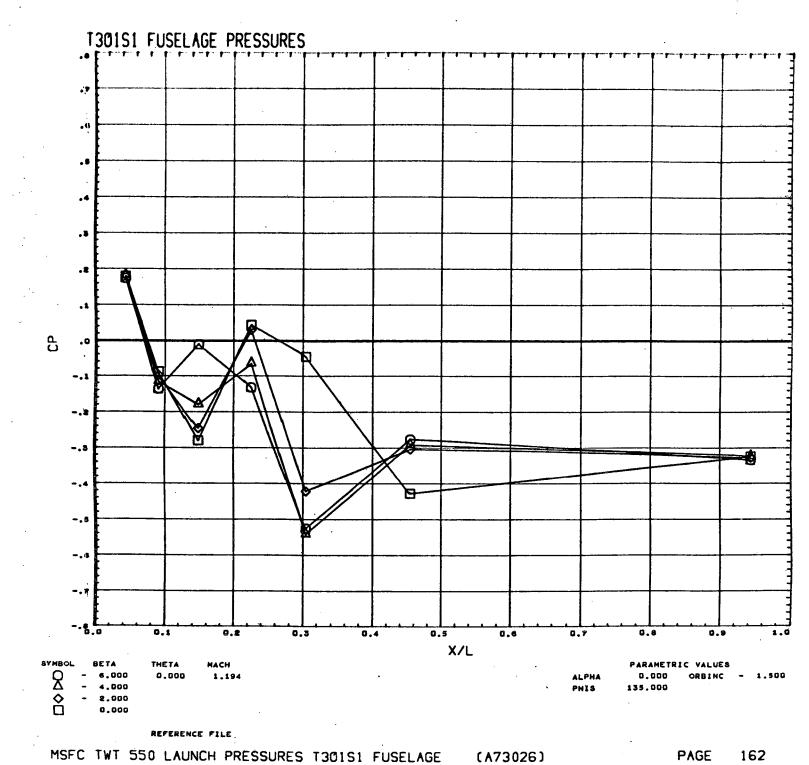


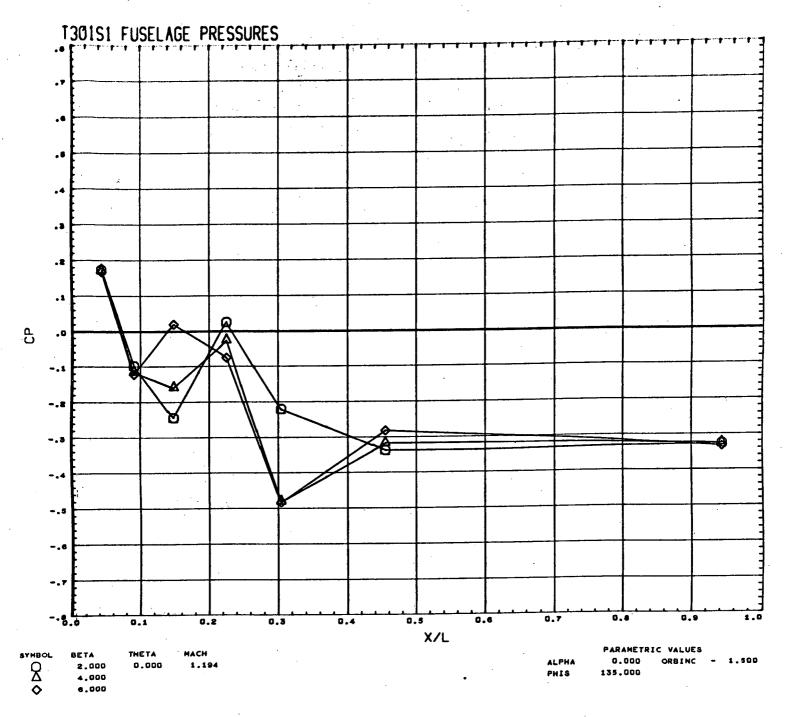
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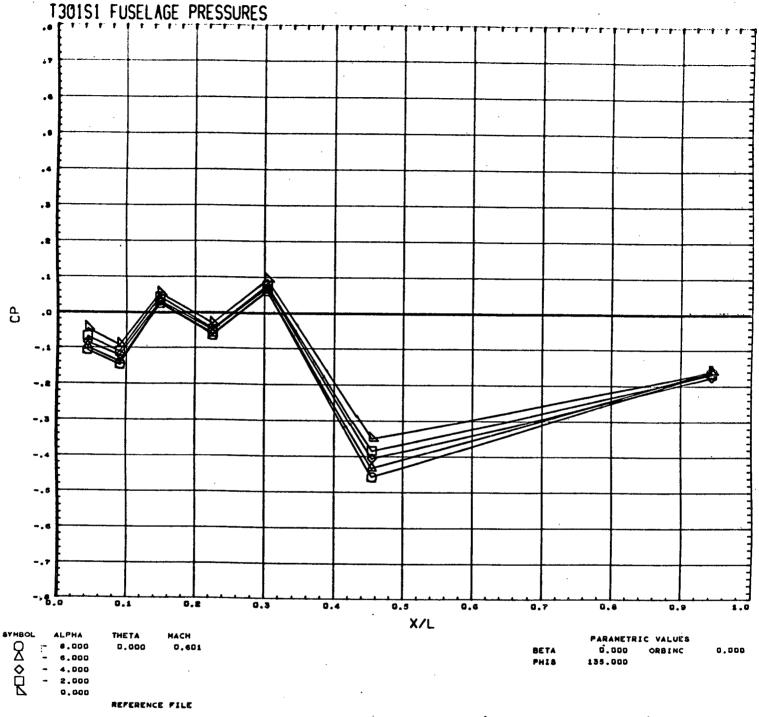


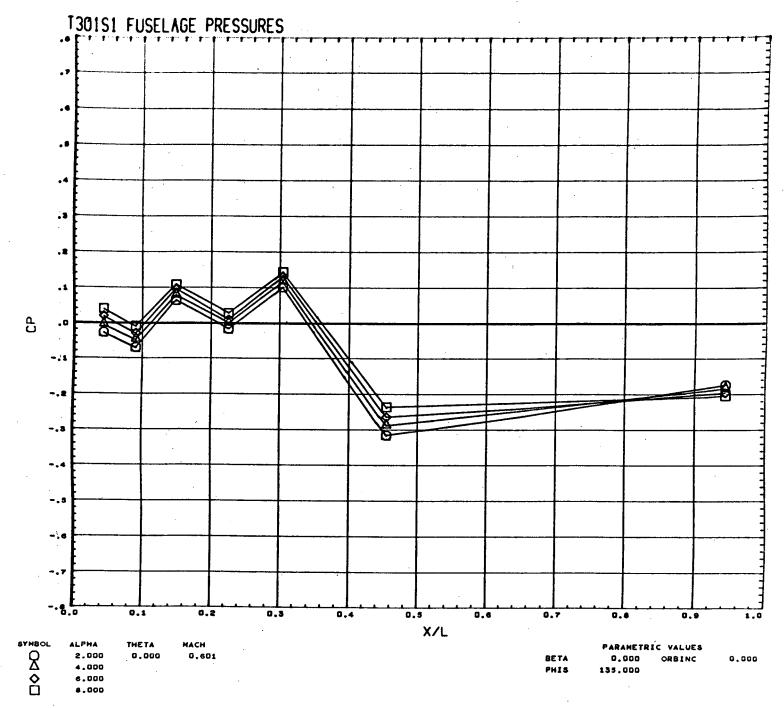
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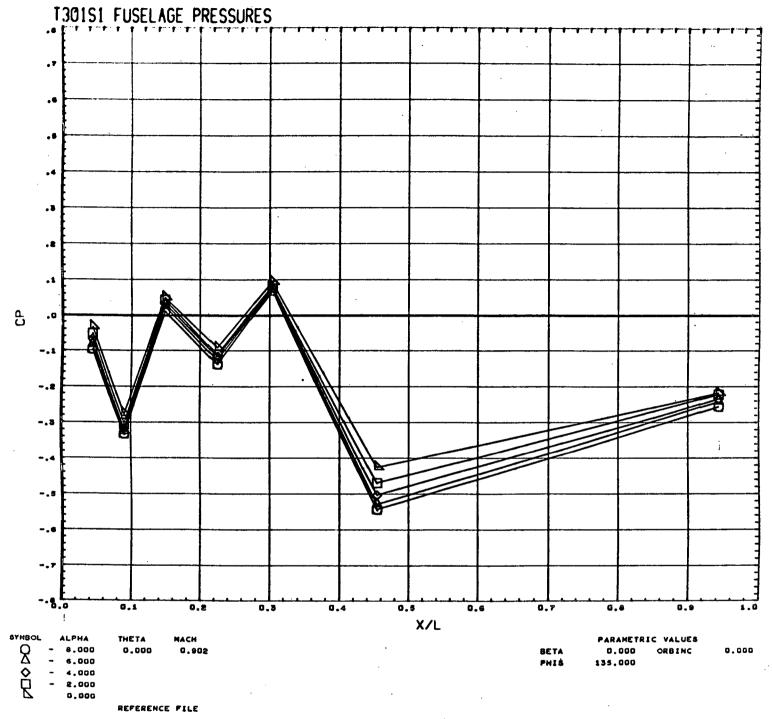


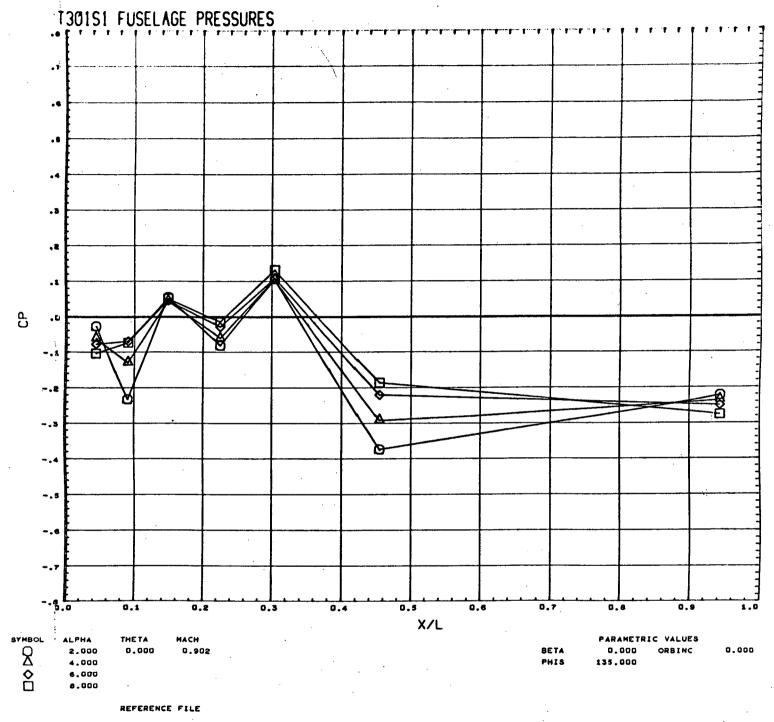
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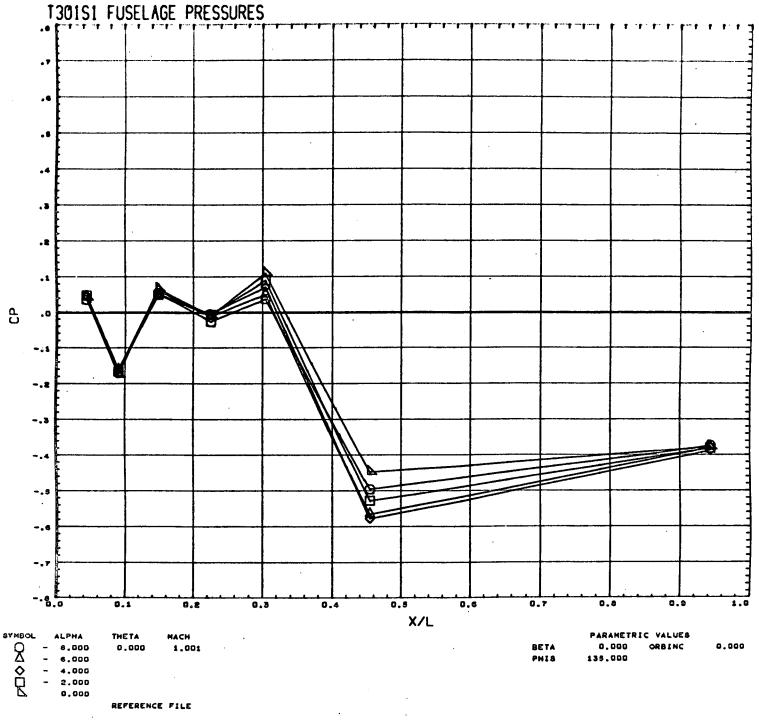


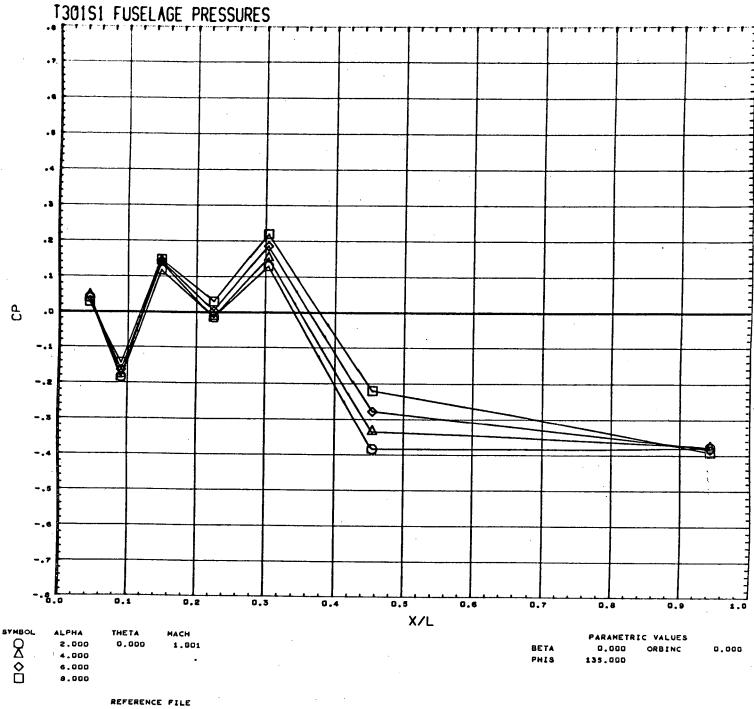


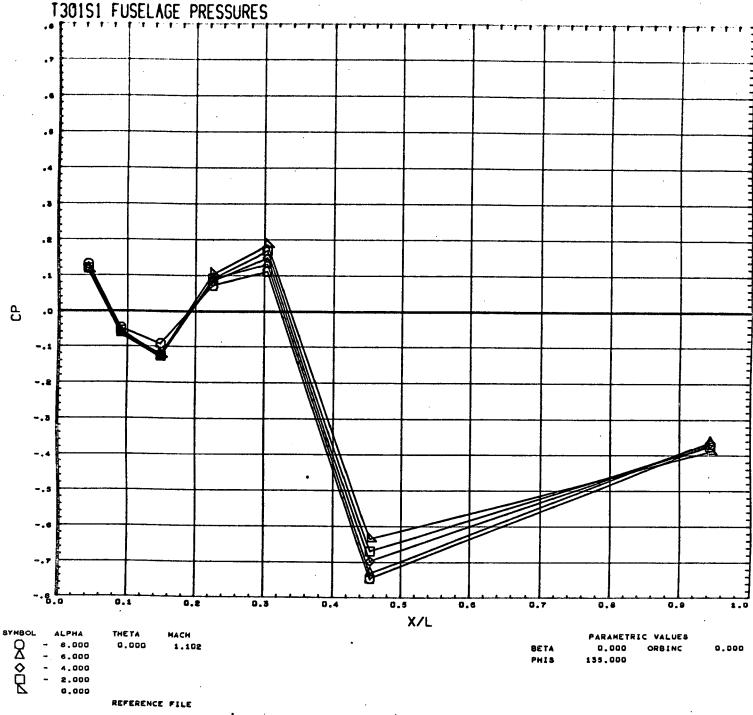
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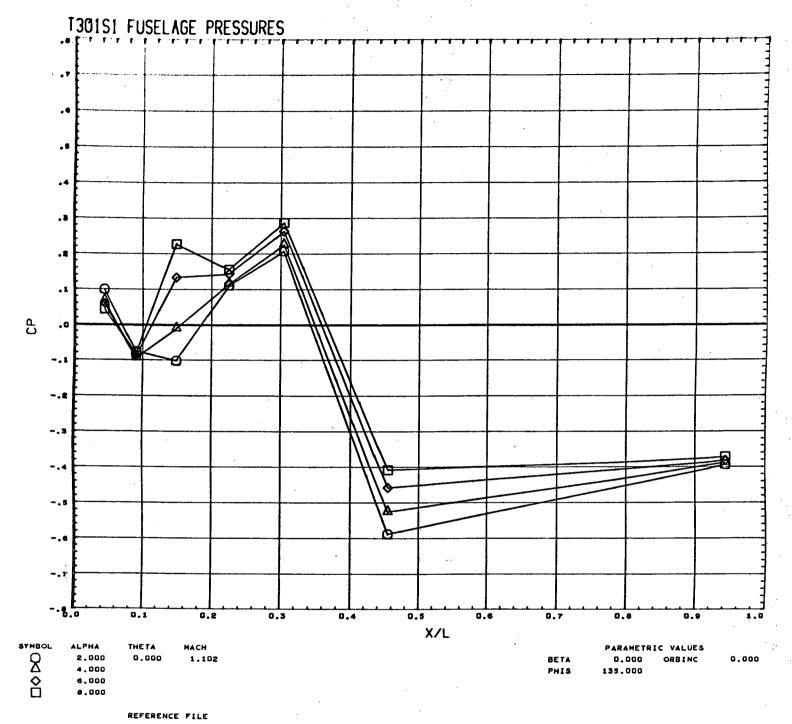


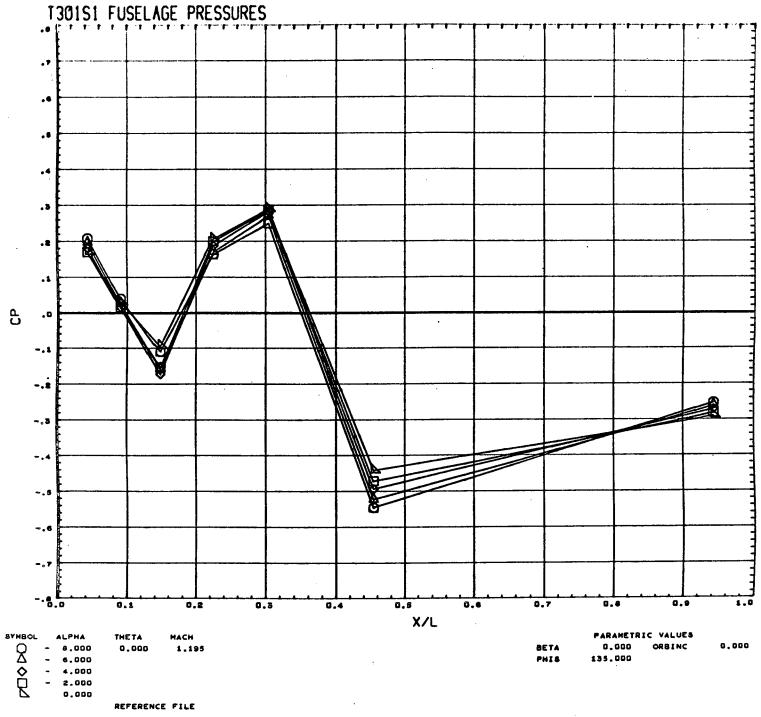


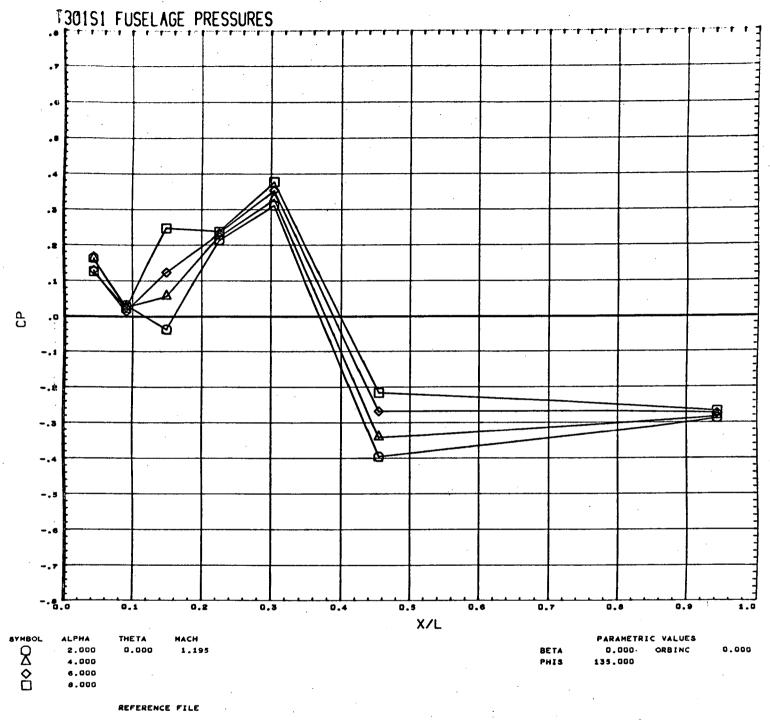


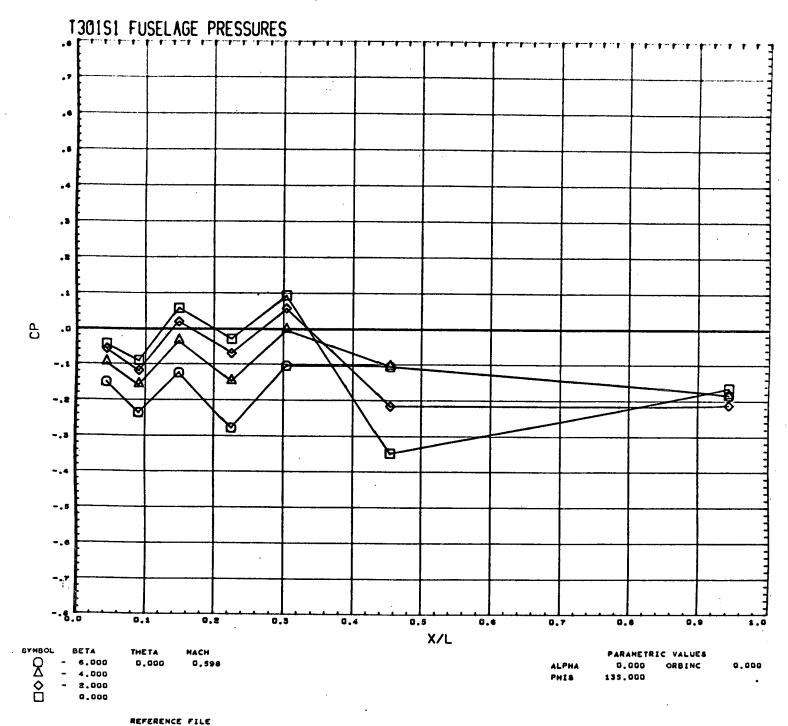


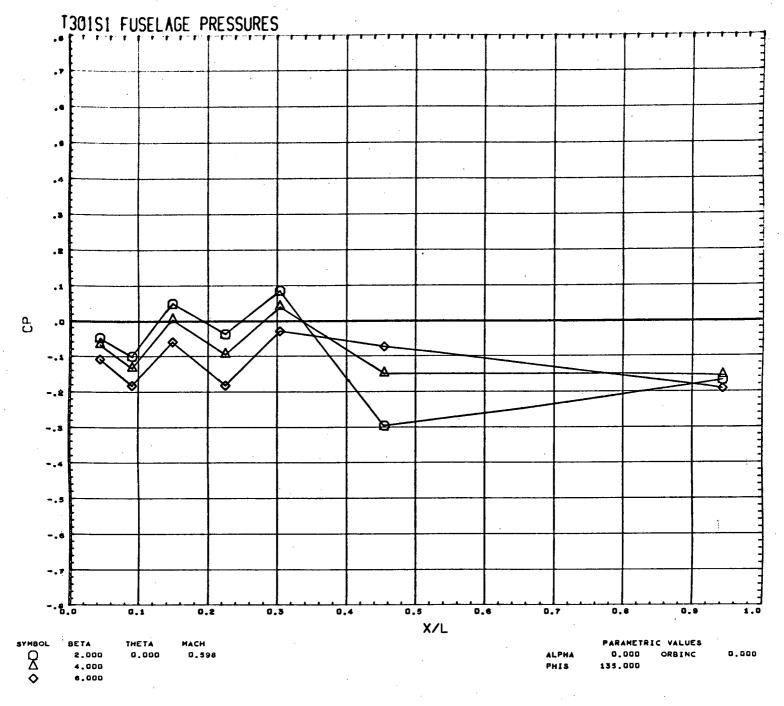




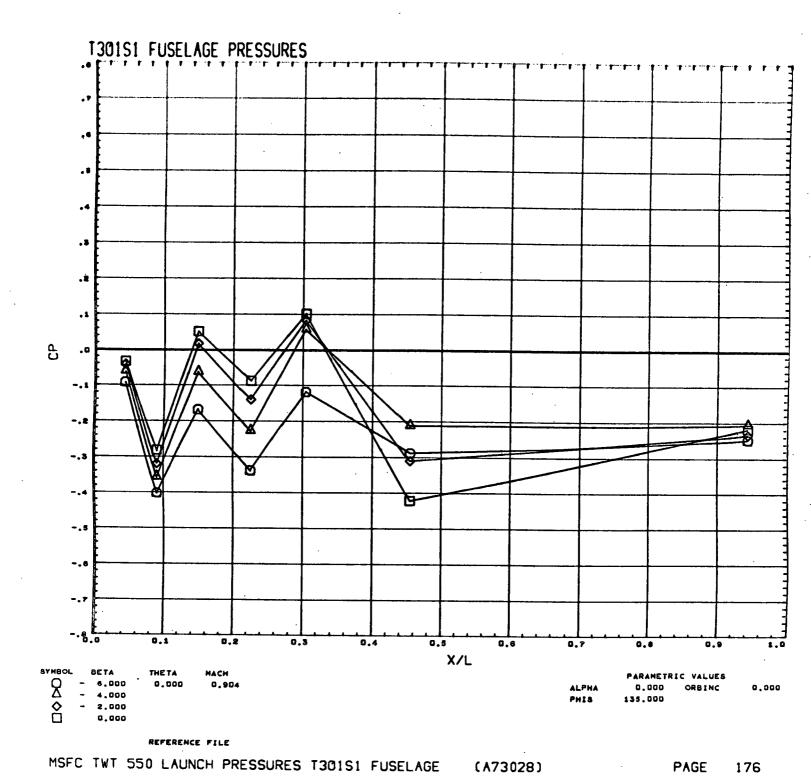


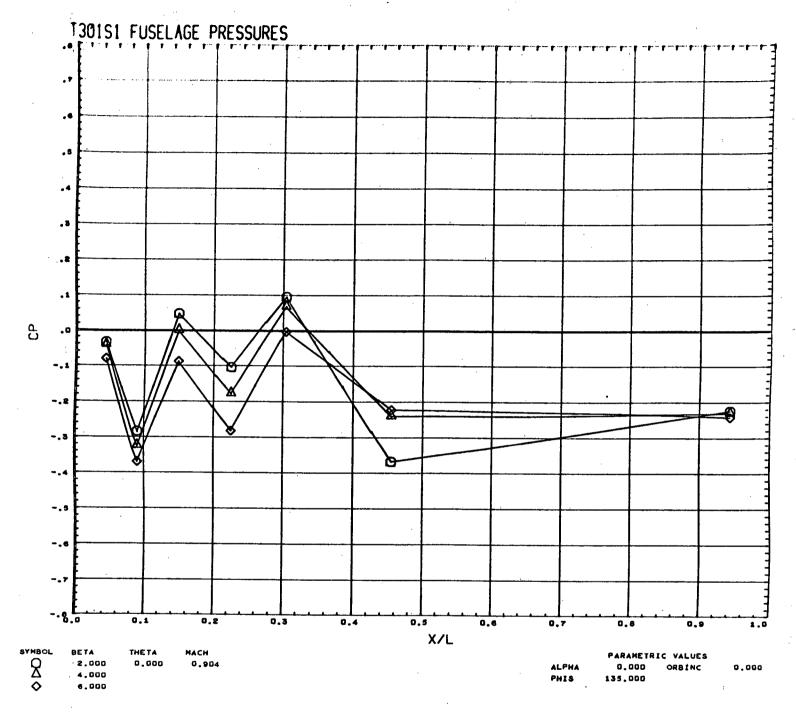




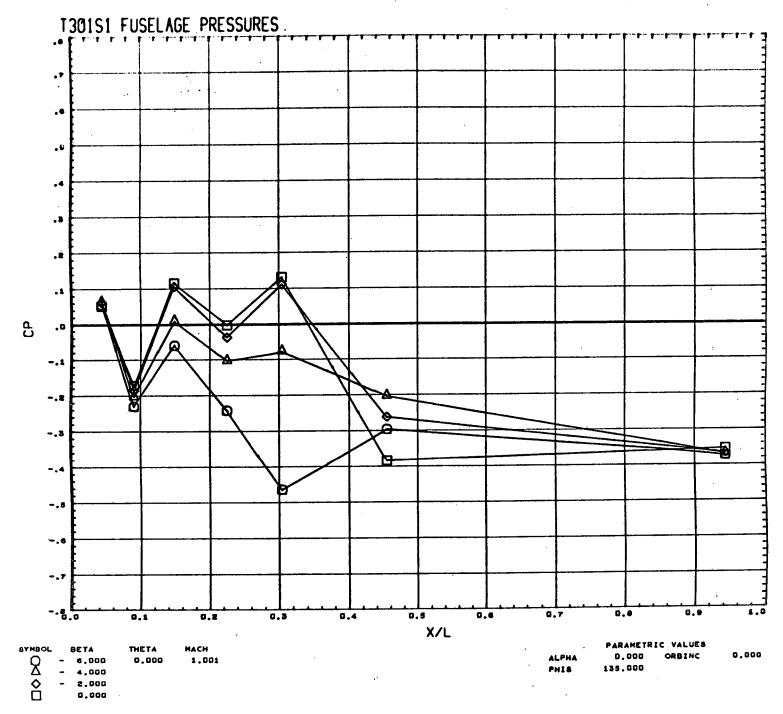


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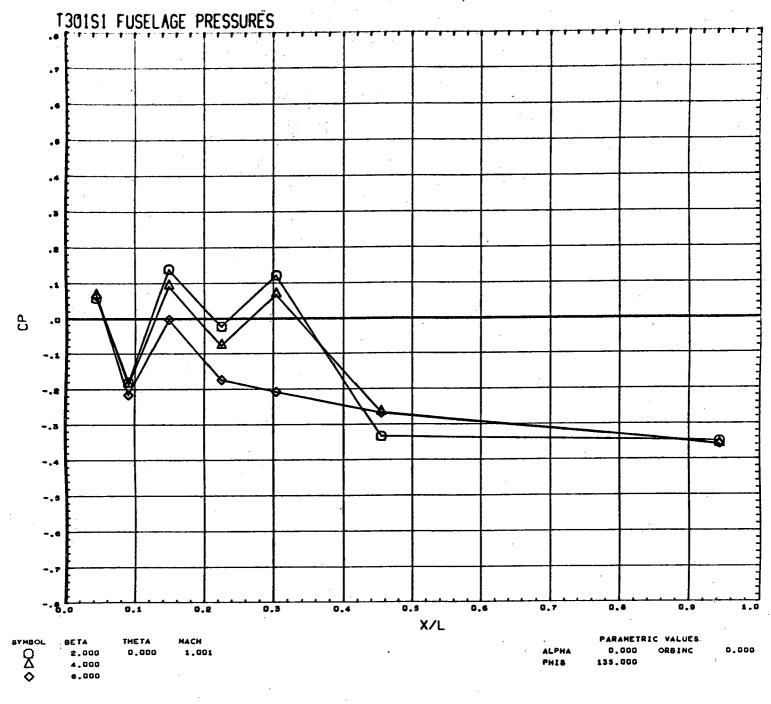




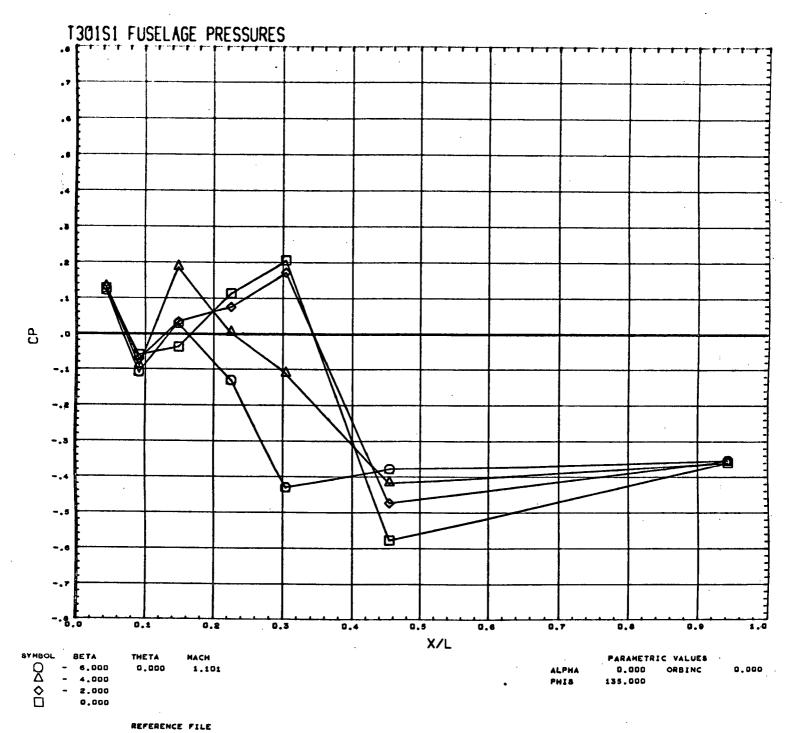
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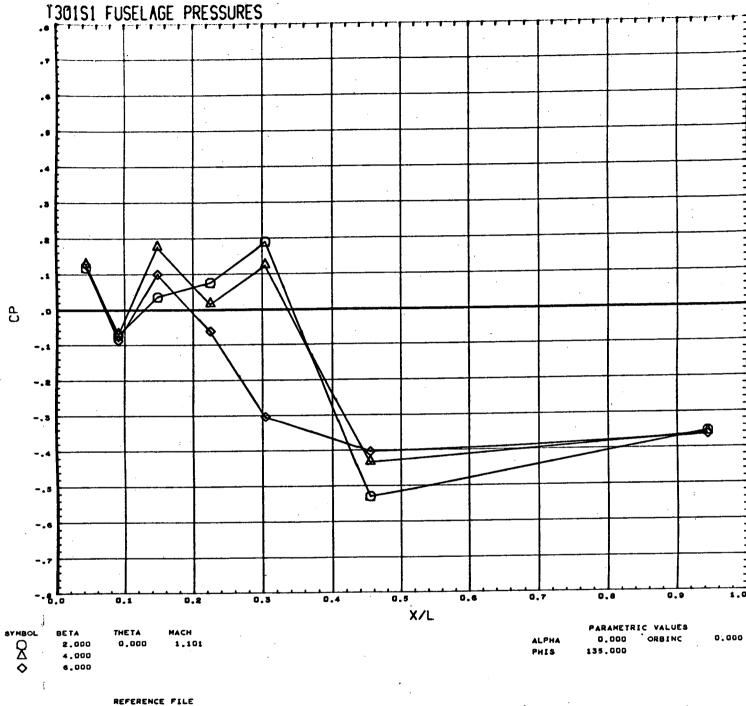


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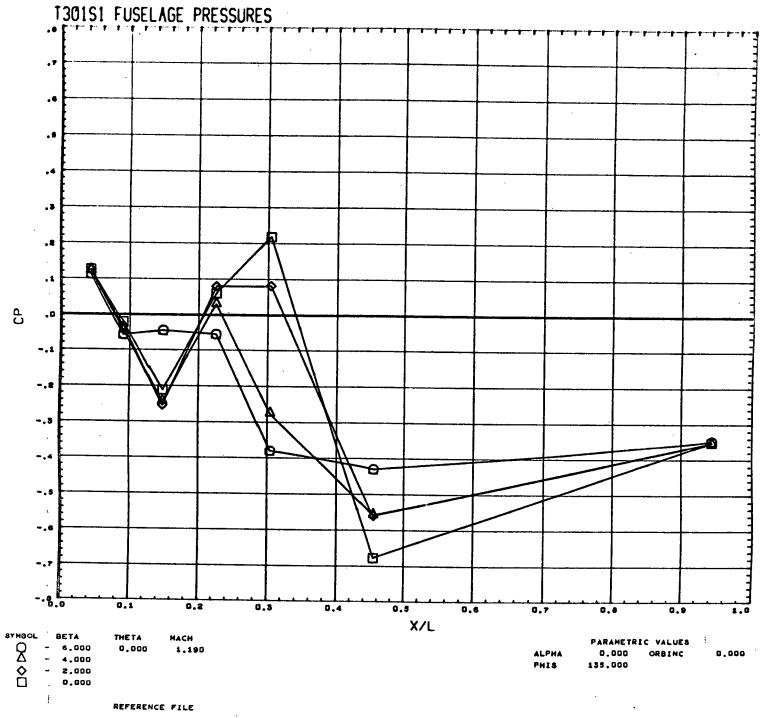


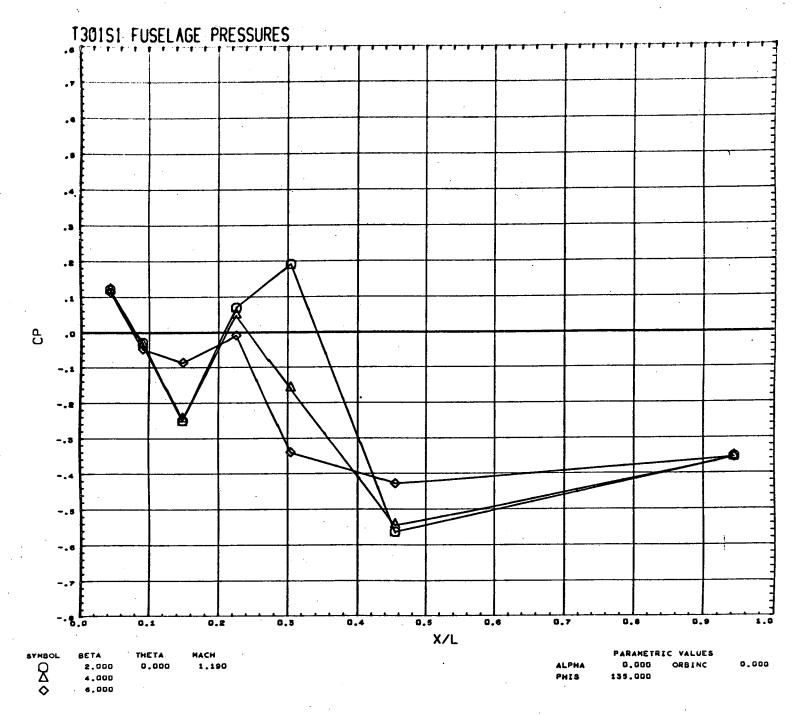
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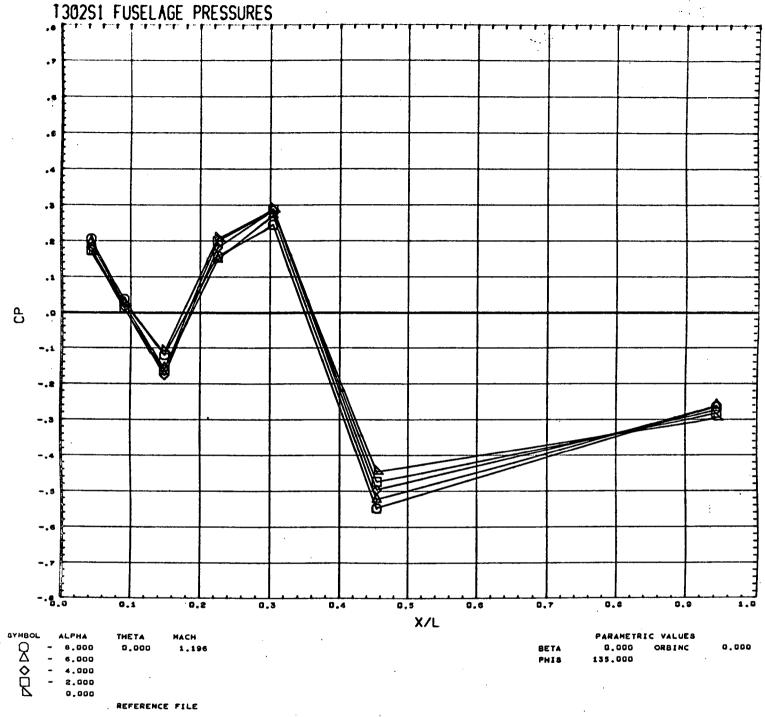


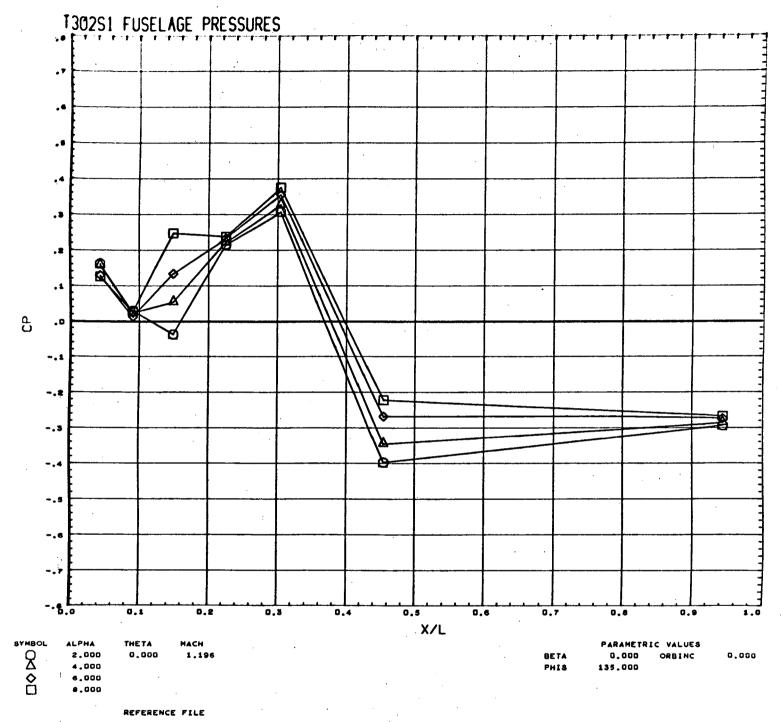


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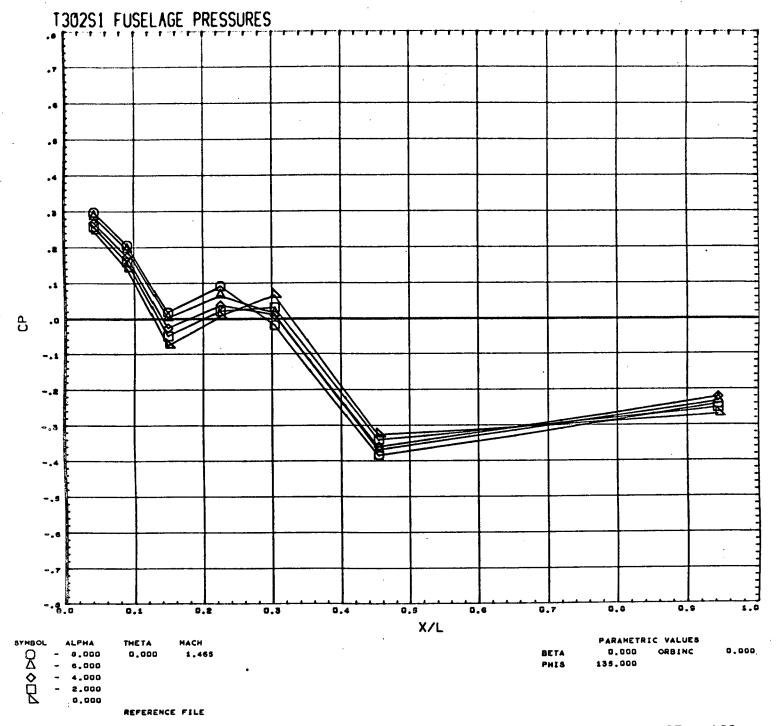
PAGE

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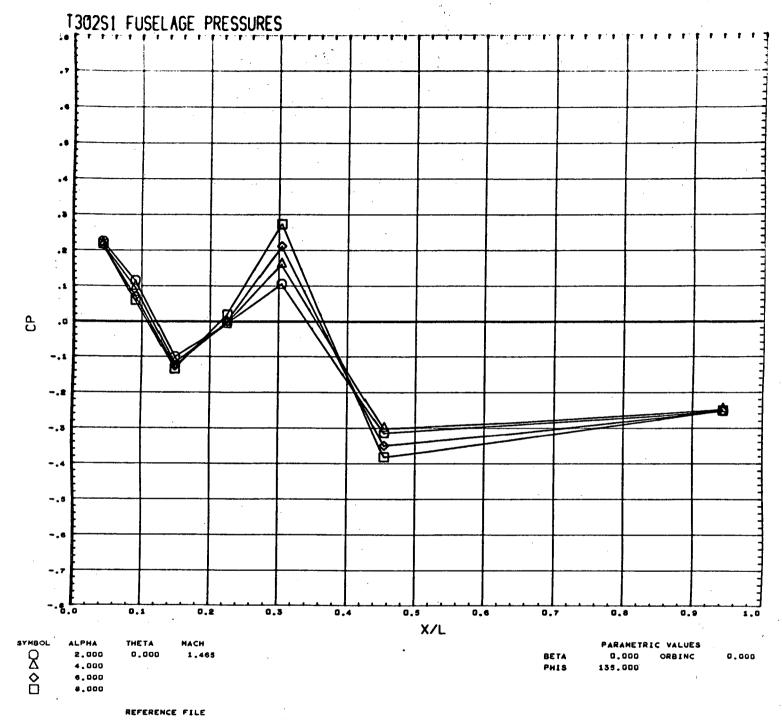




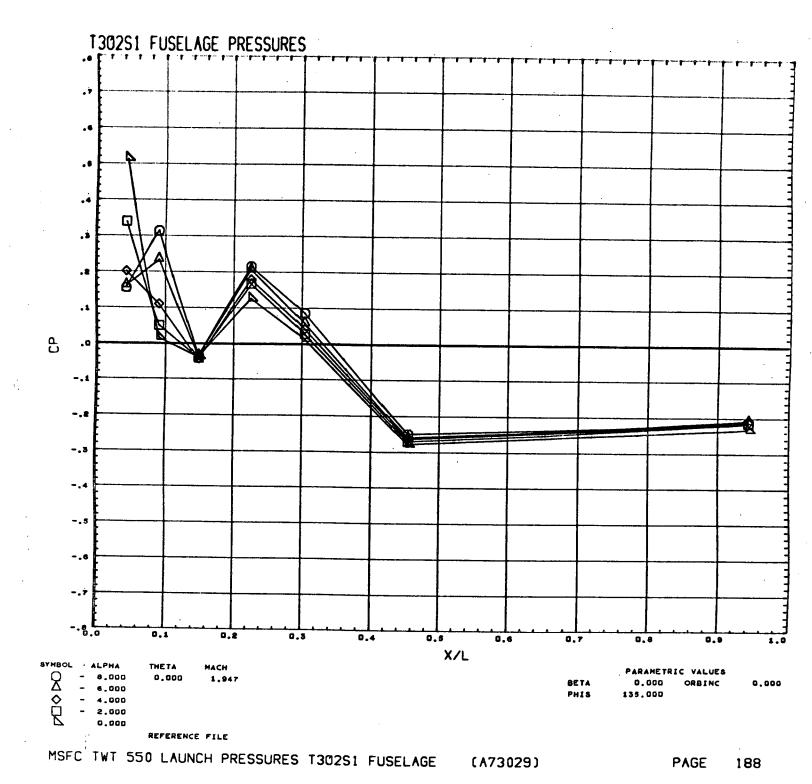
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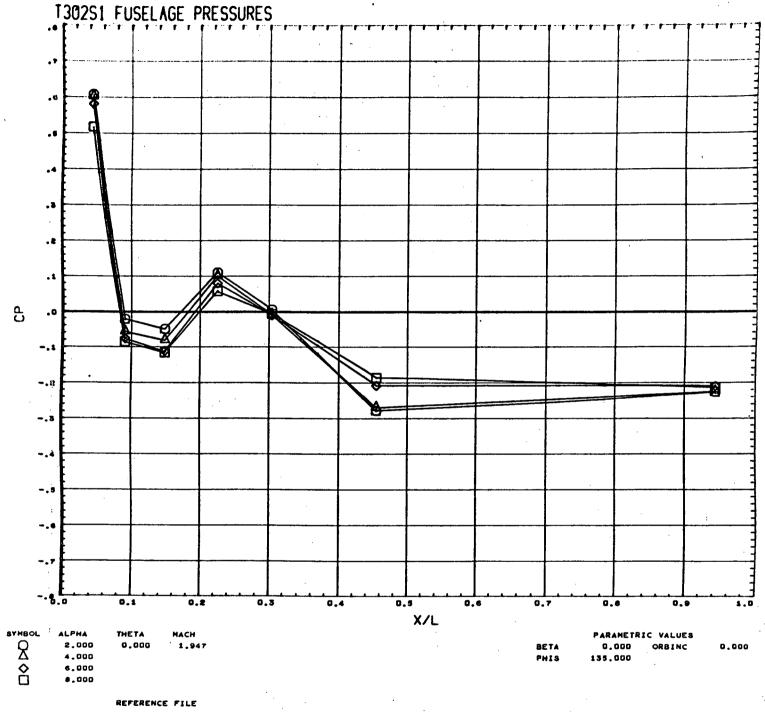


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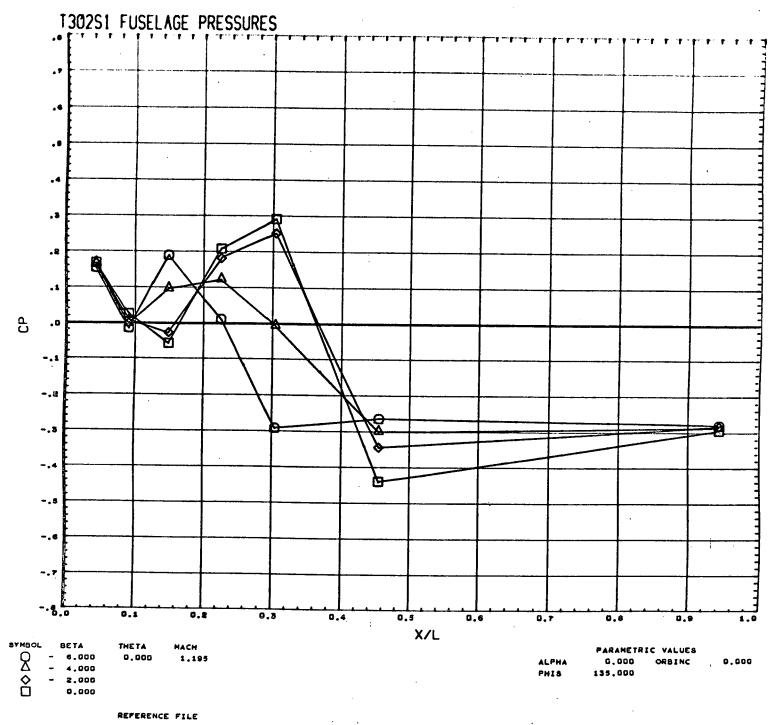


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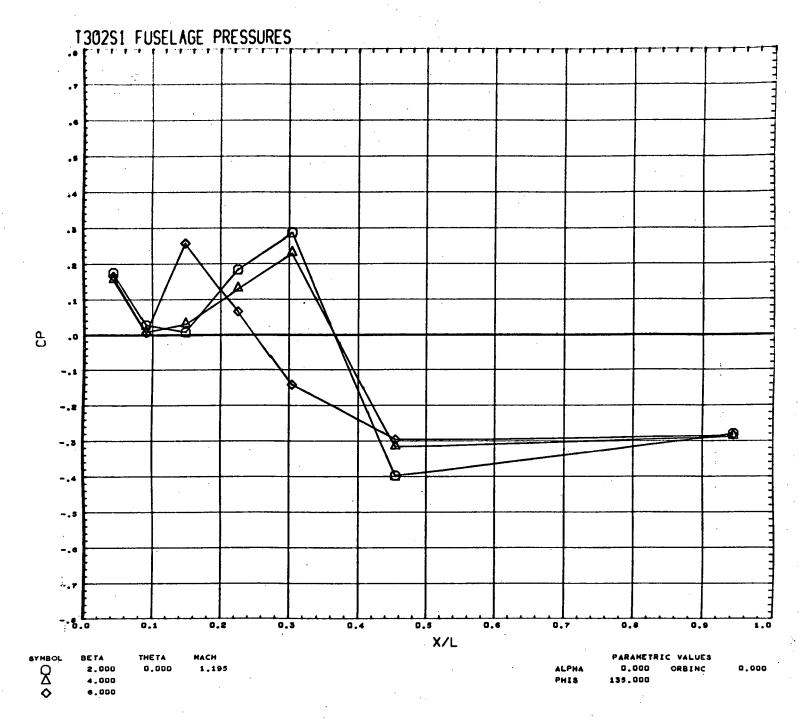
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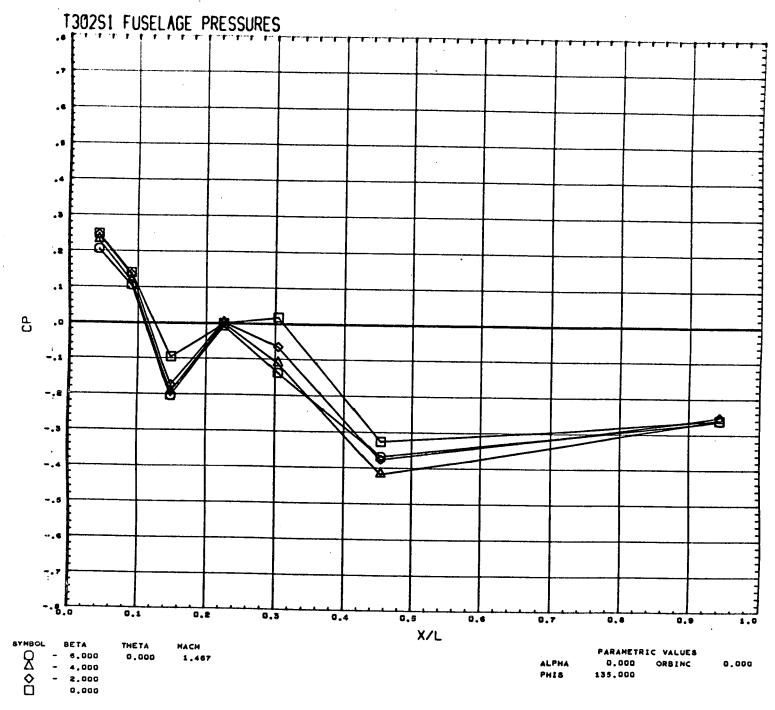
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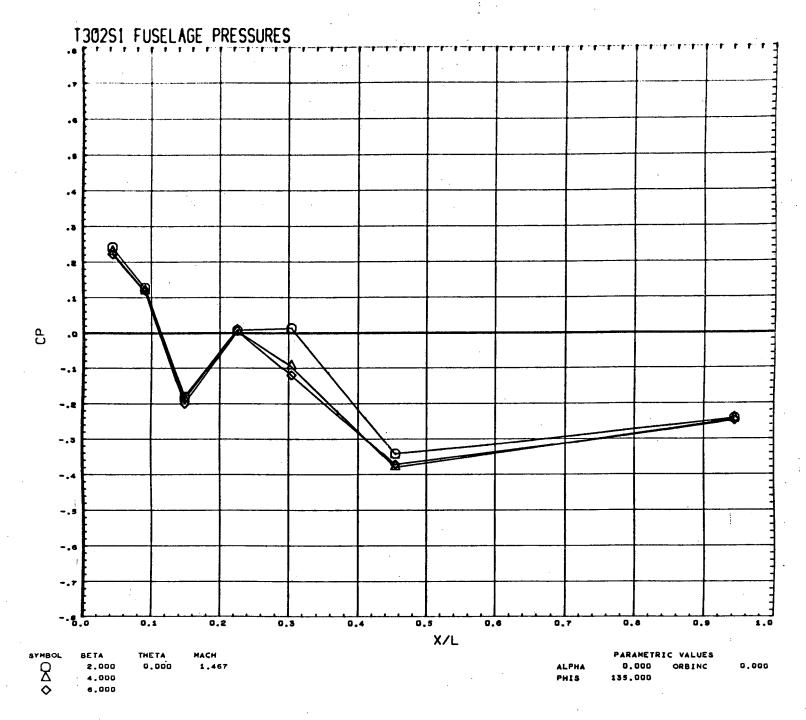


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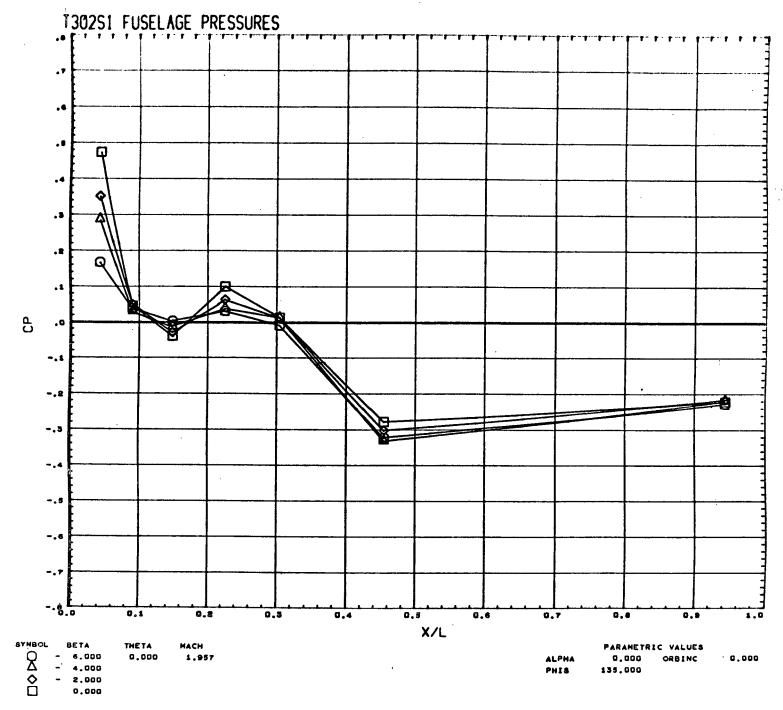


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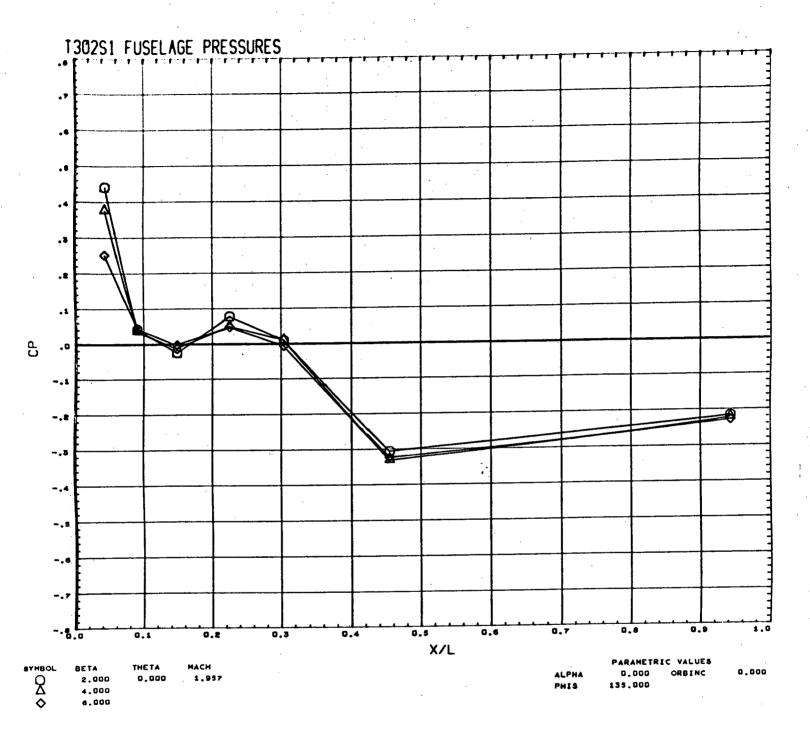


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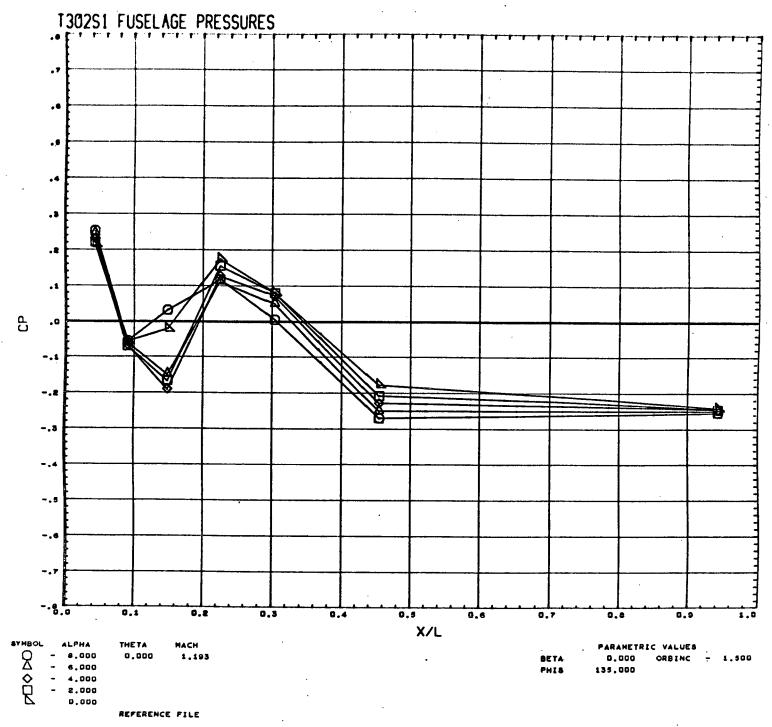
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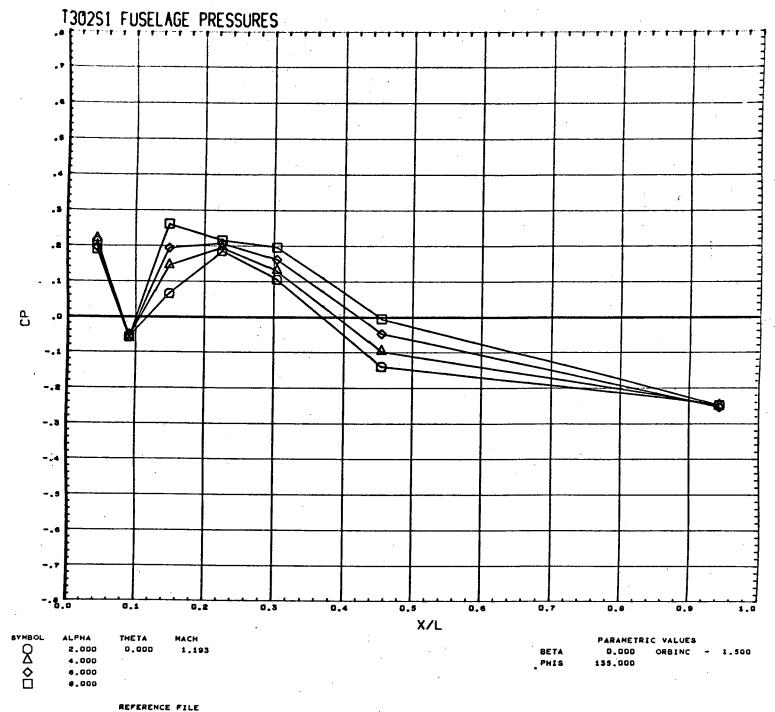
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PAGE

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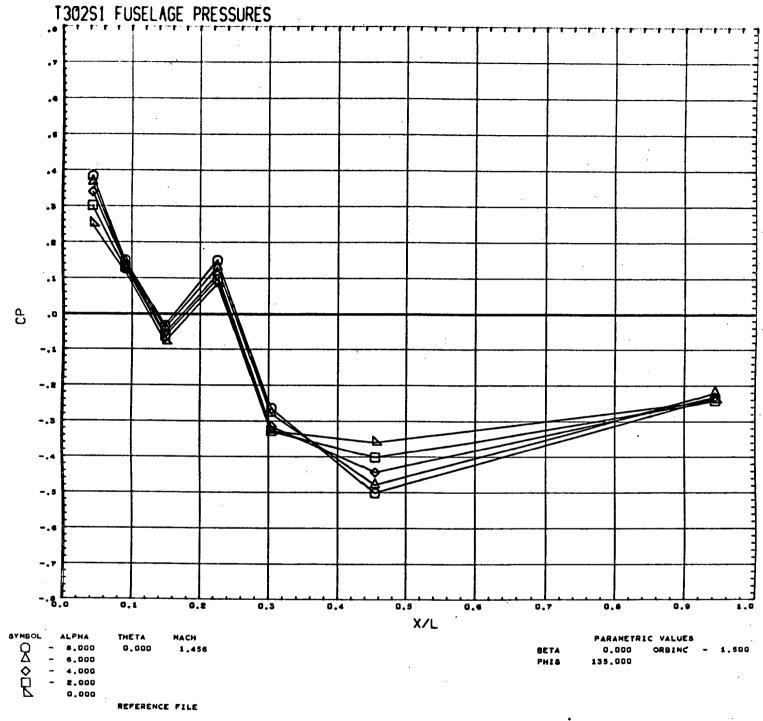


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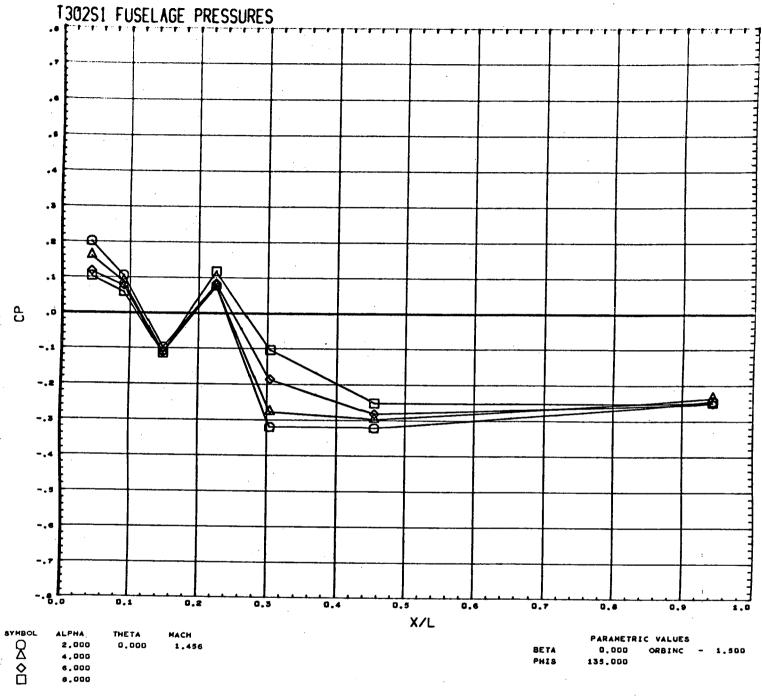


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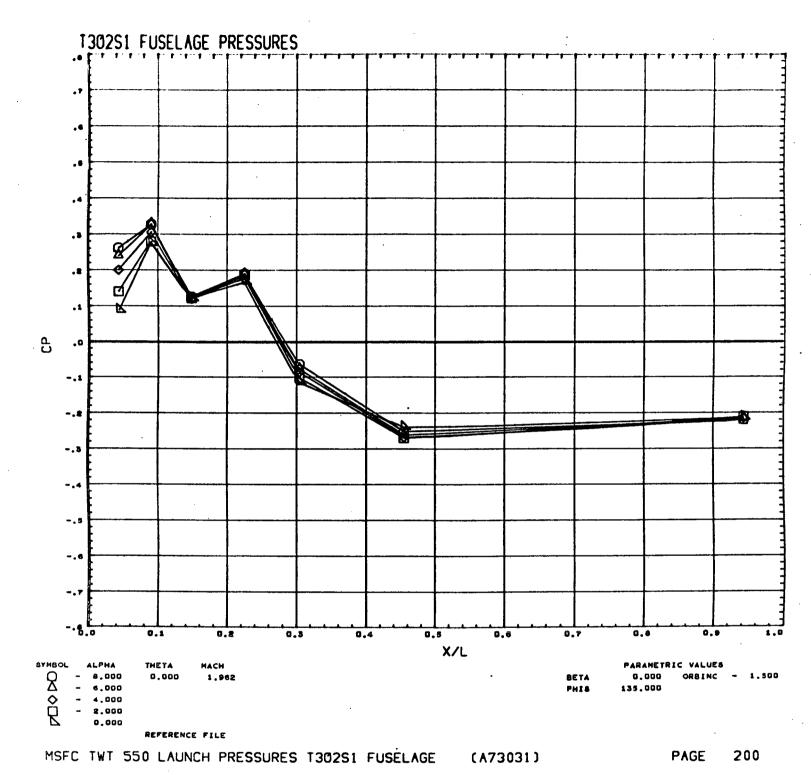


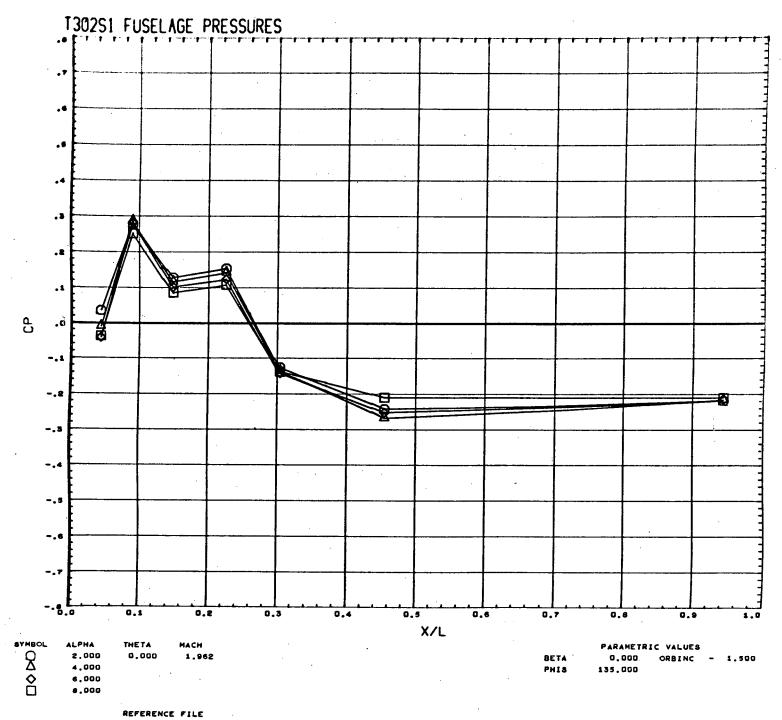
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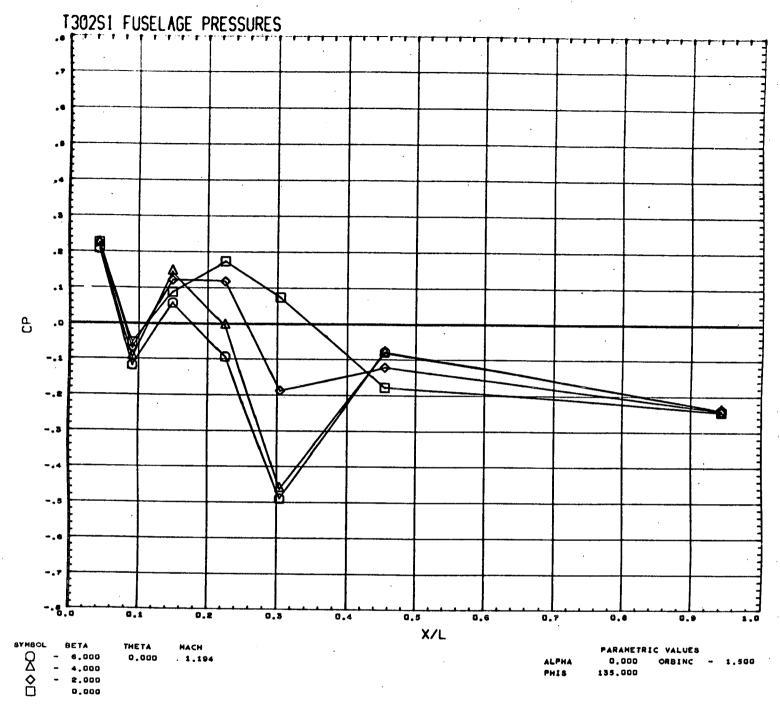
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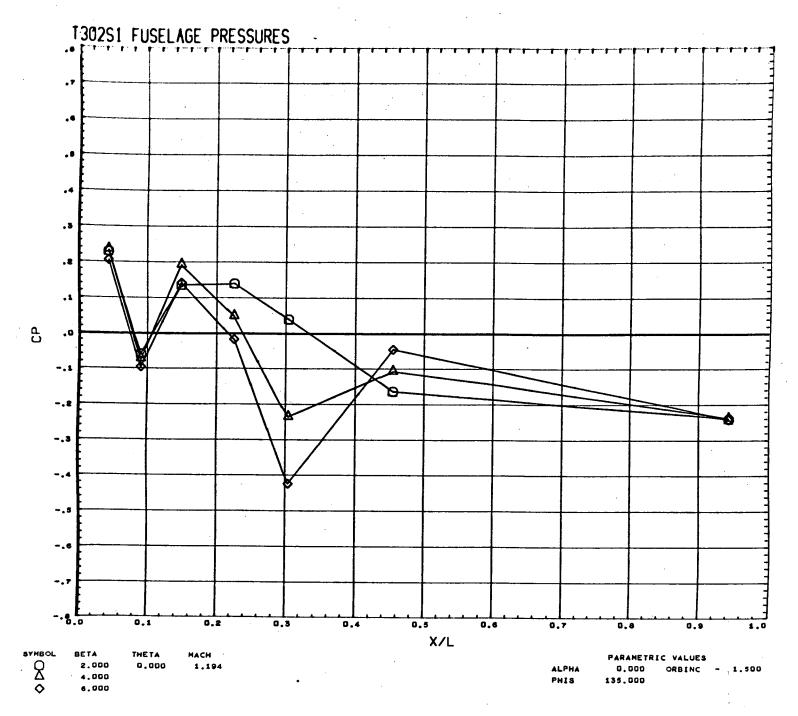




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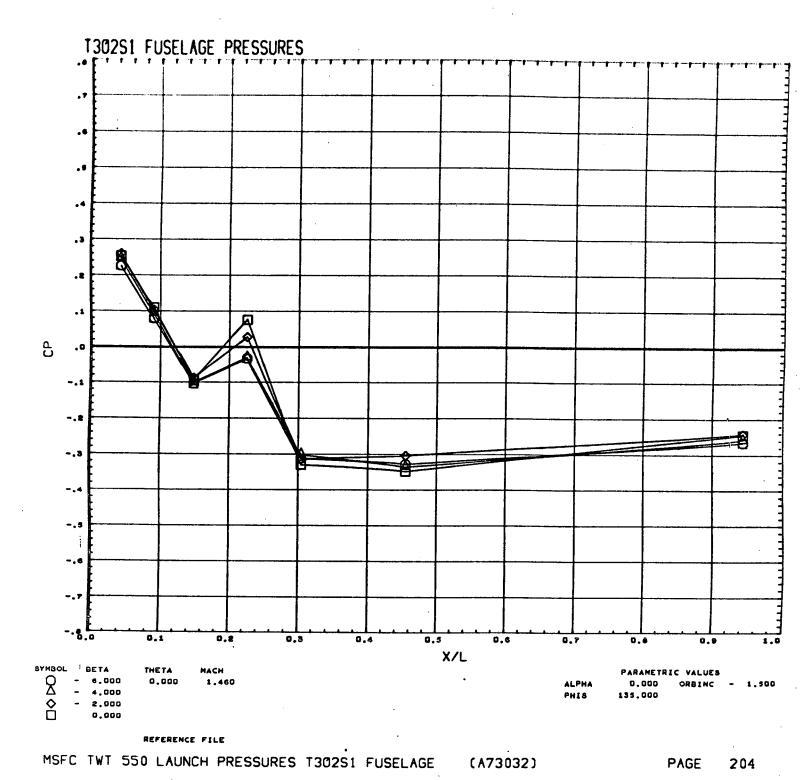


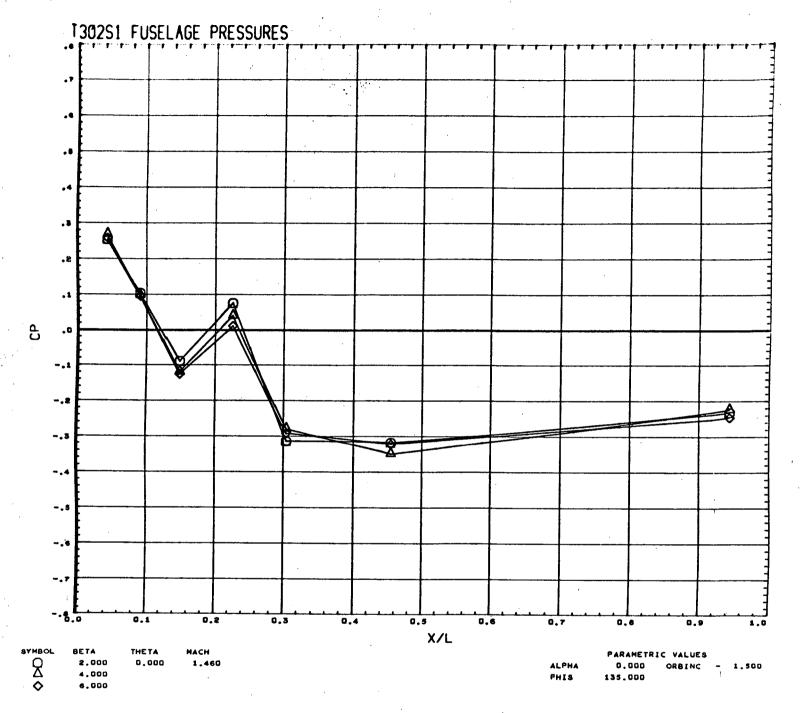
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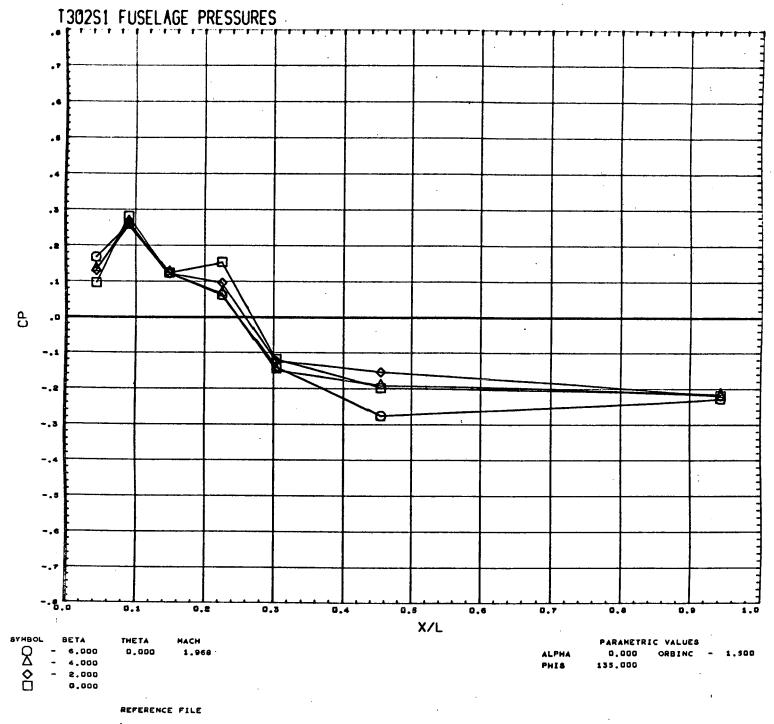
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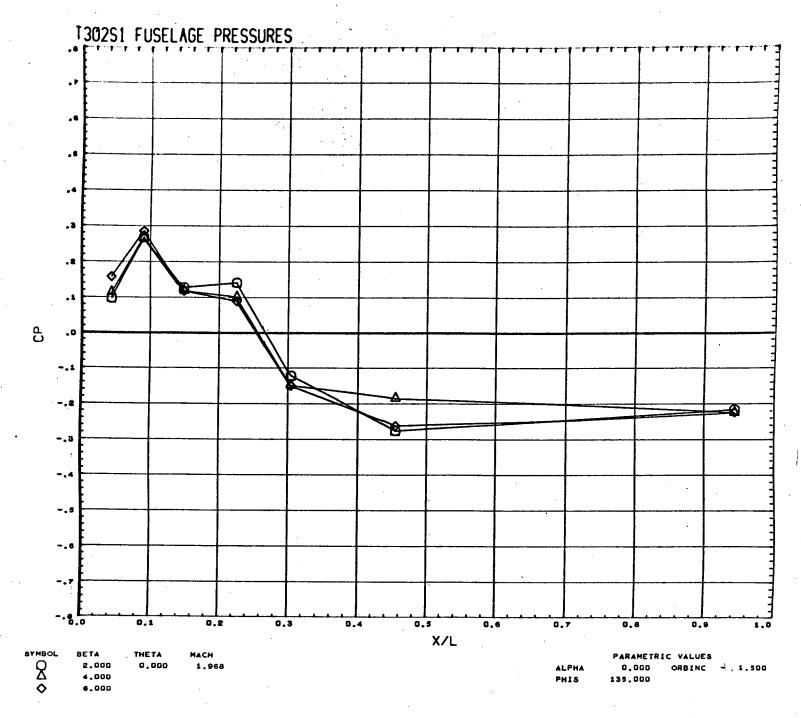


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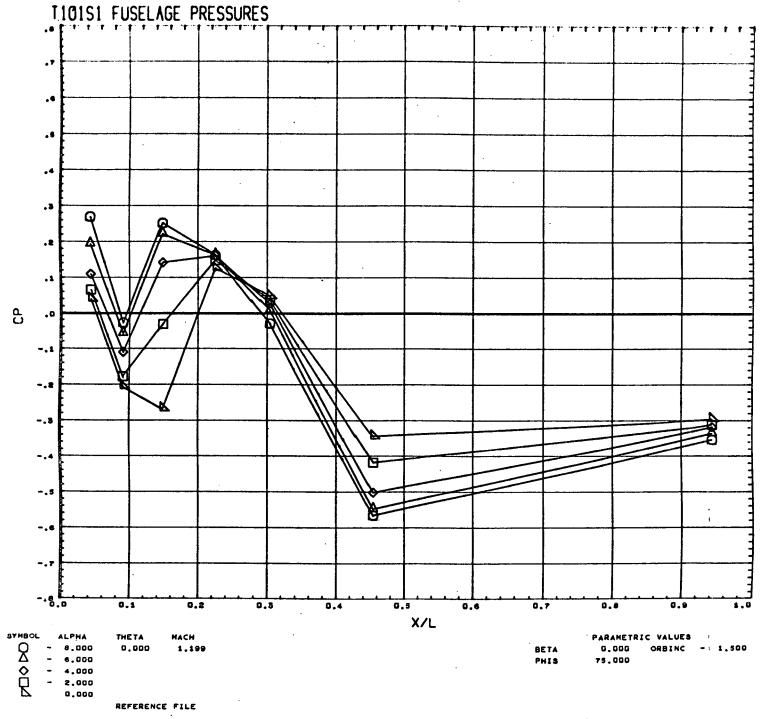
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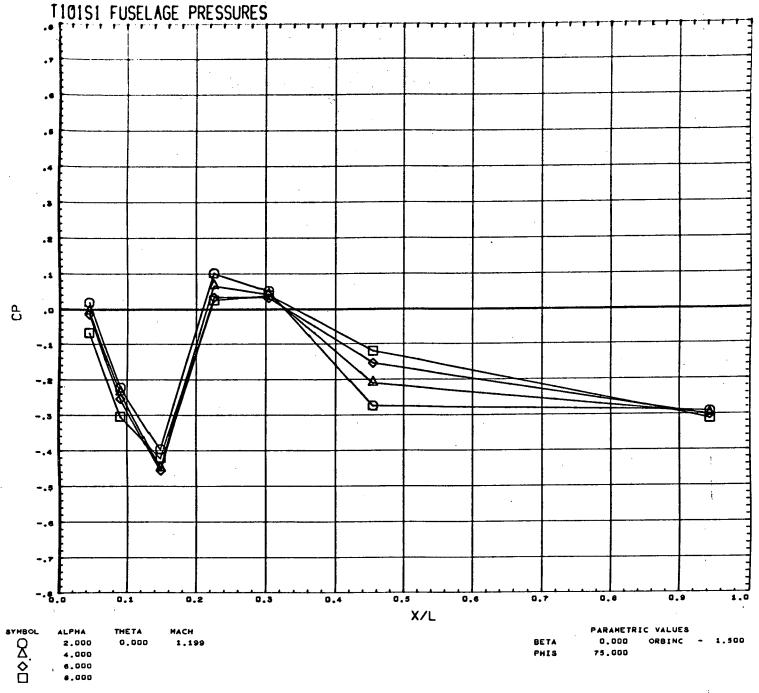
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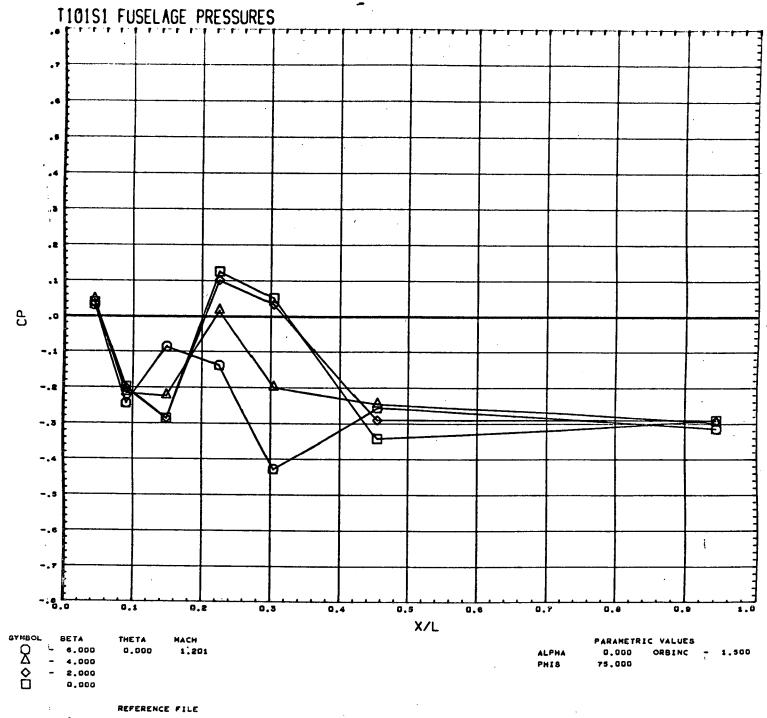


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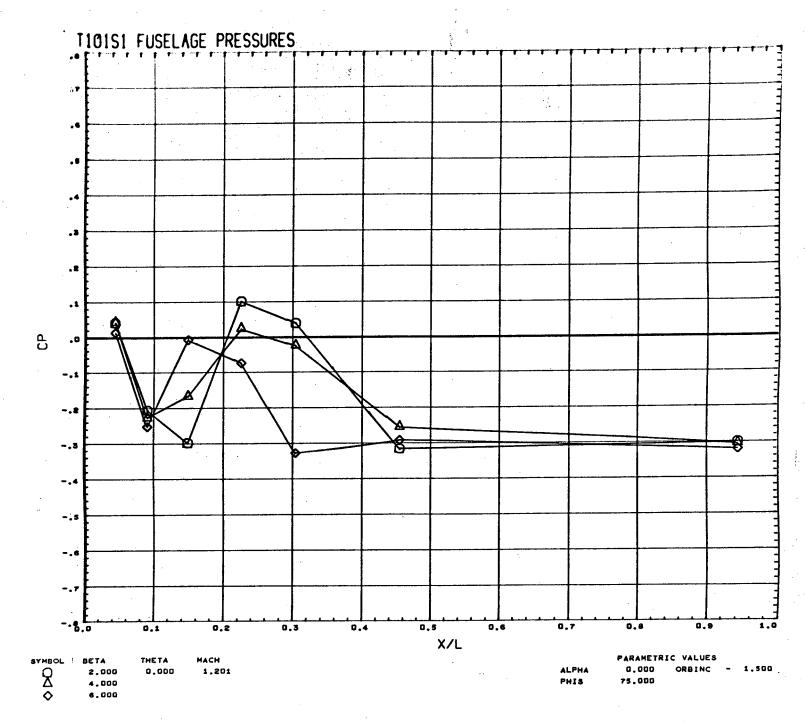
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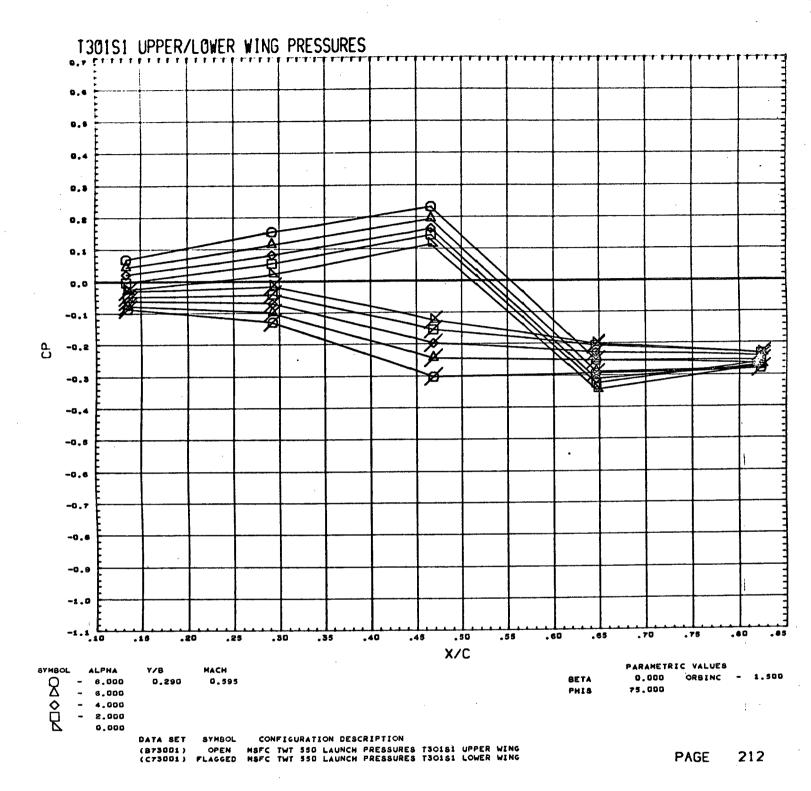
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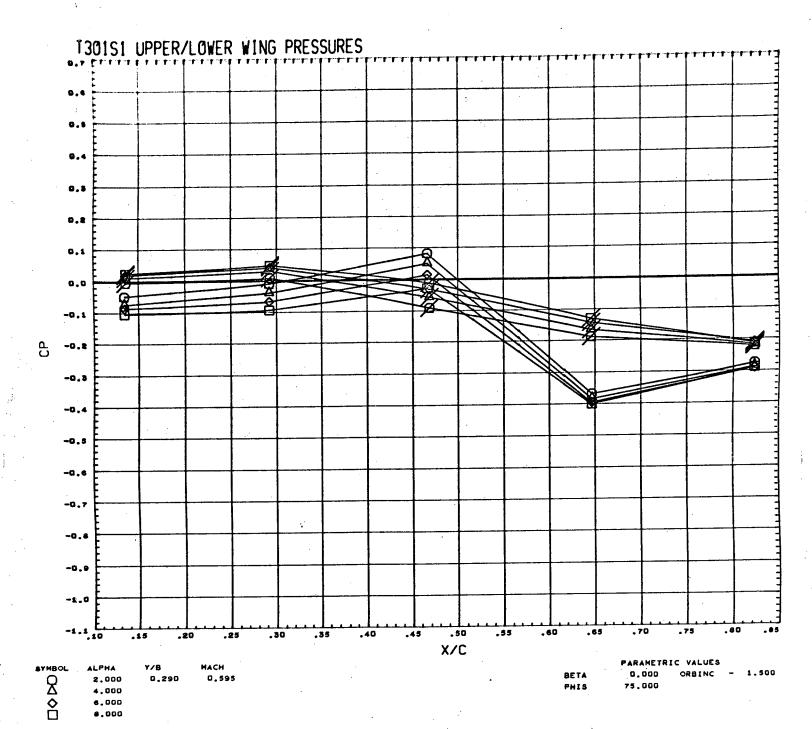
PAGE 210

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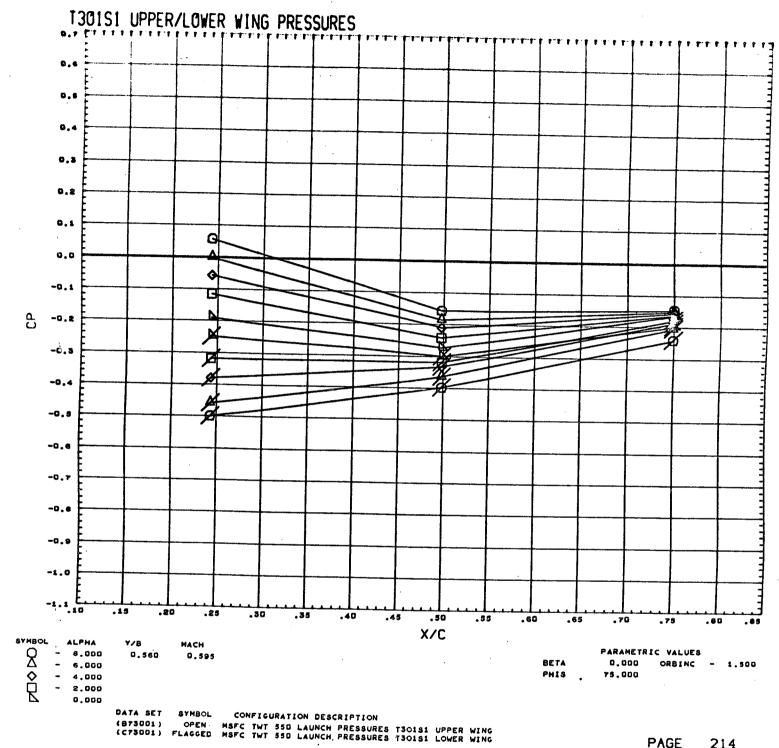


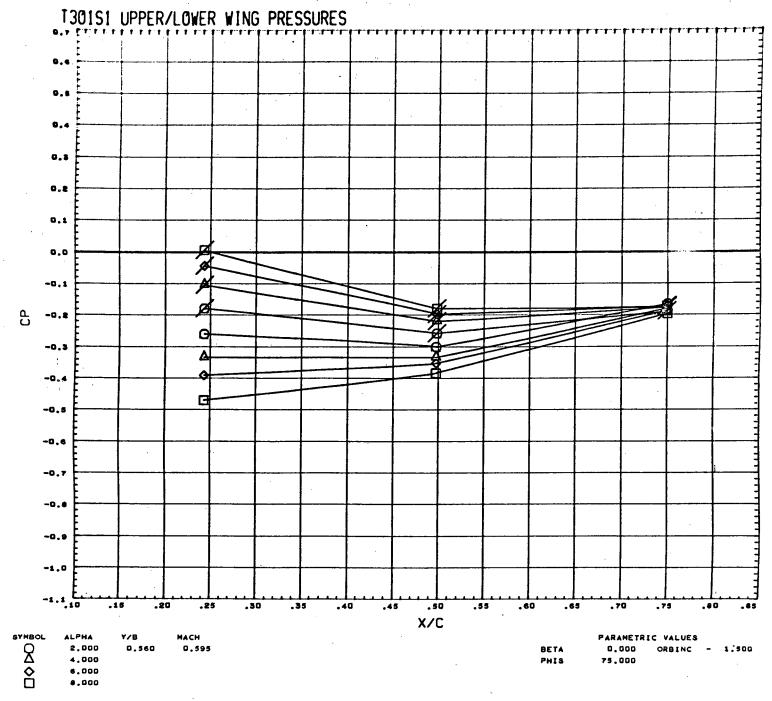
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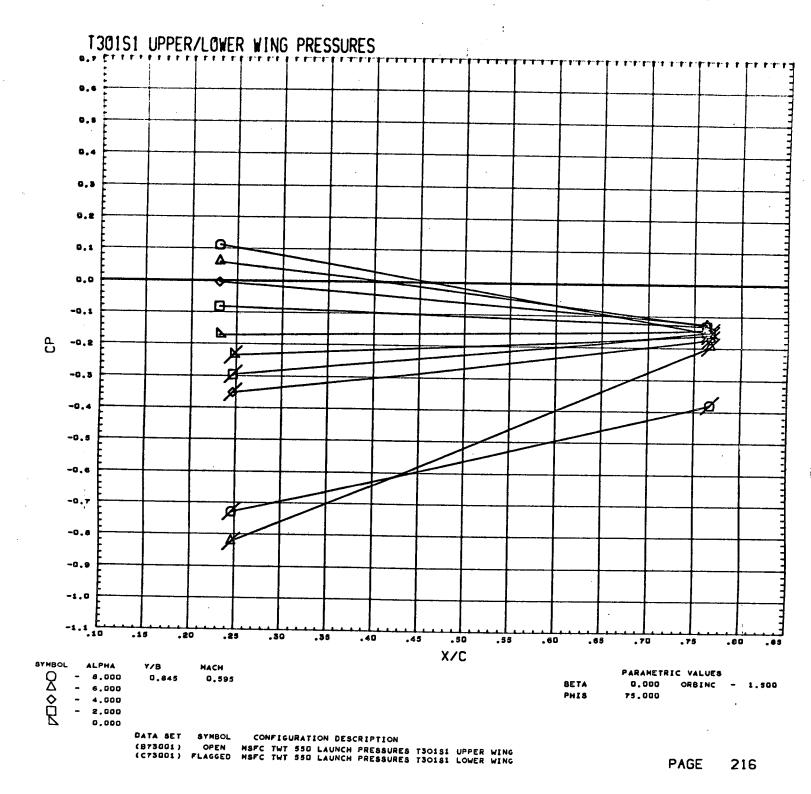


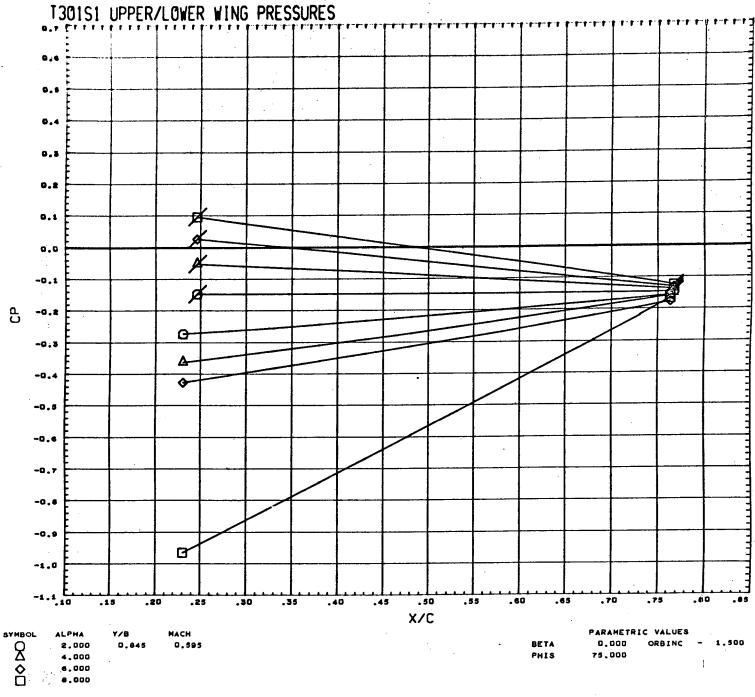


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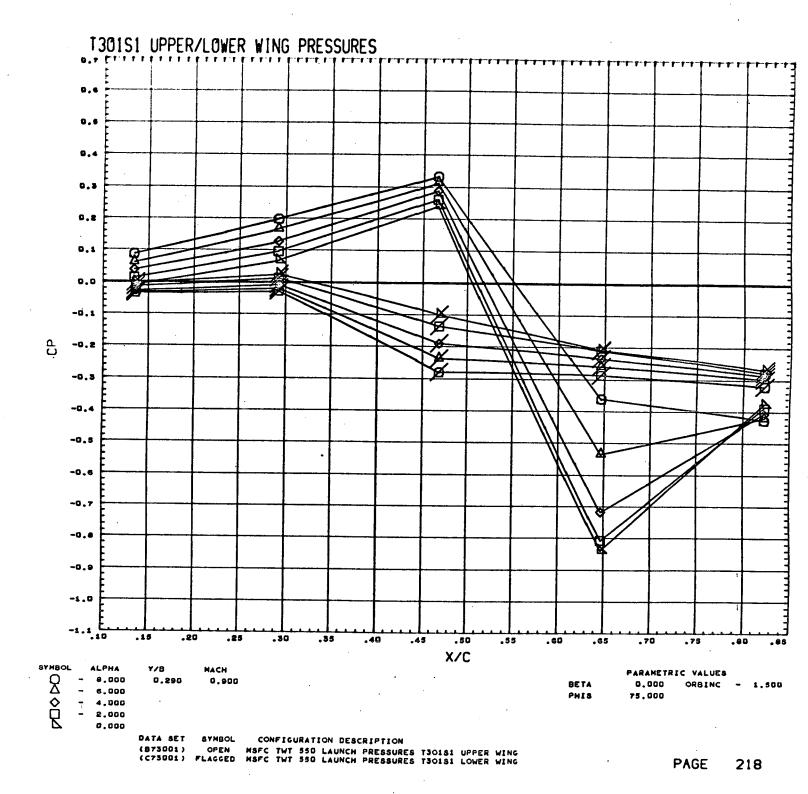
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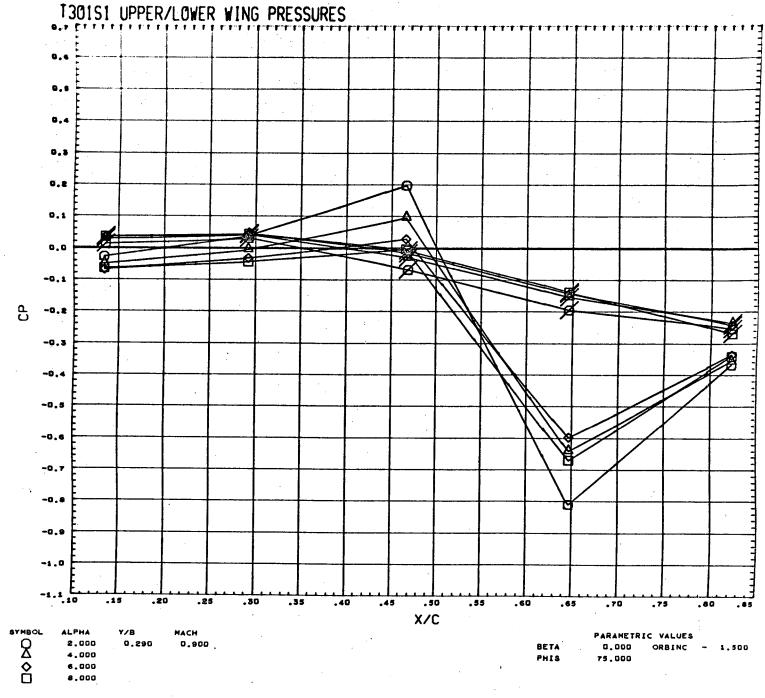
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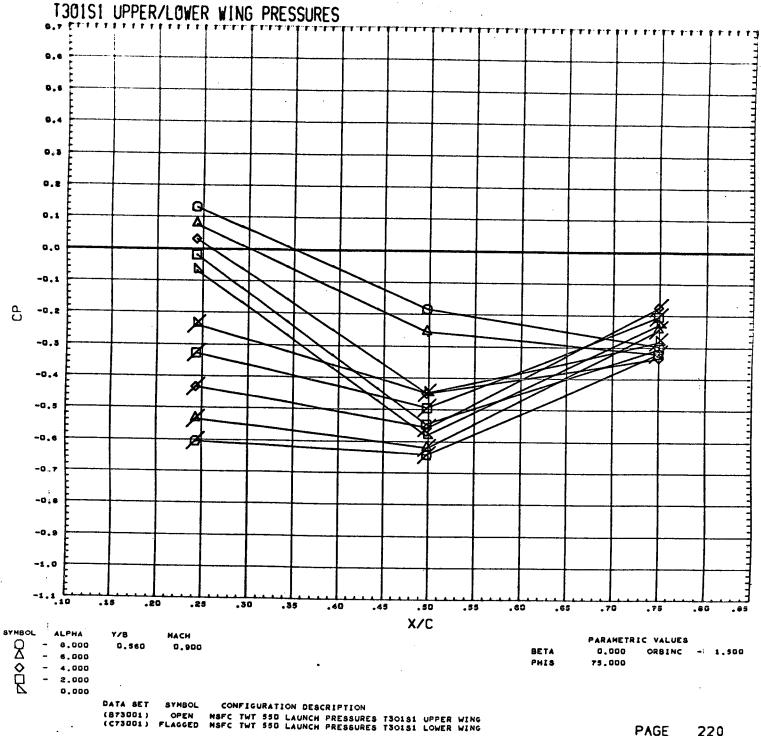


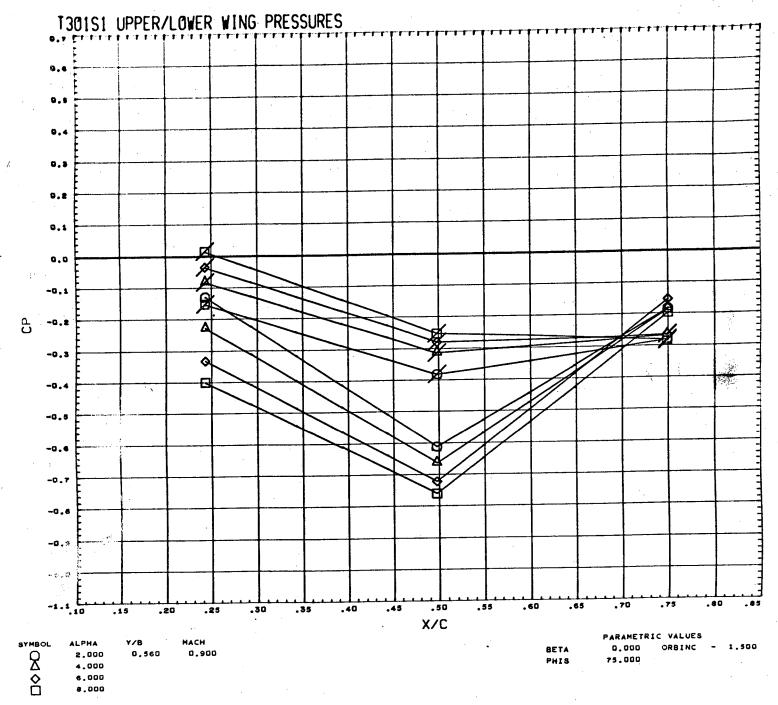
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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING





DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

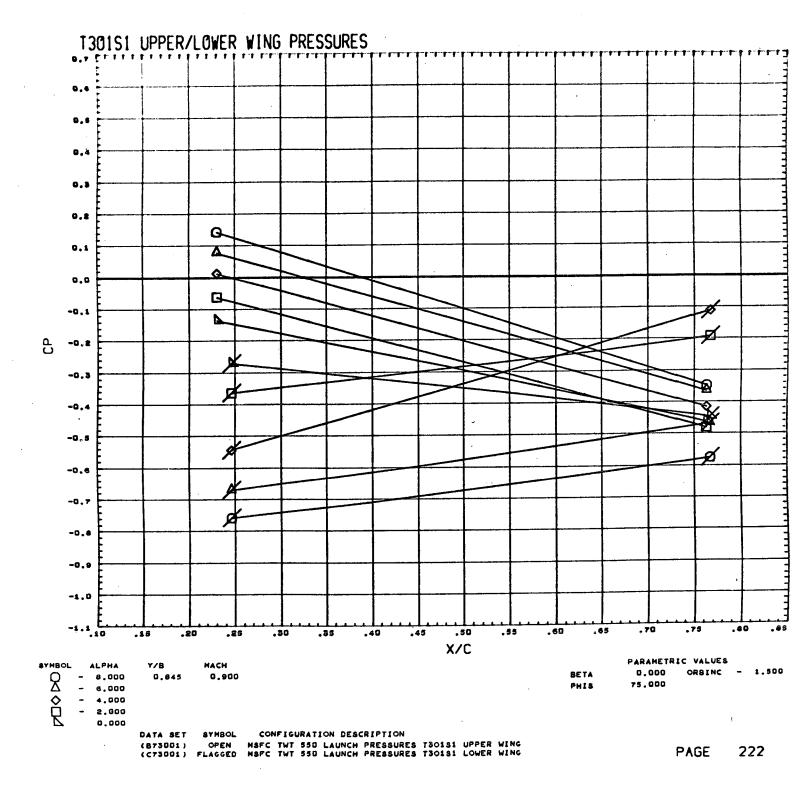


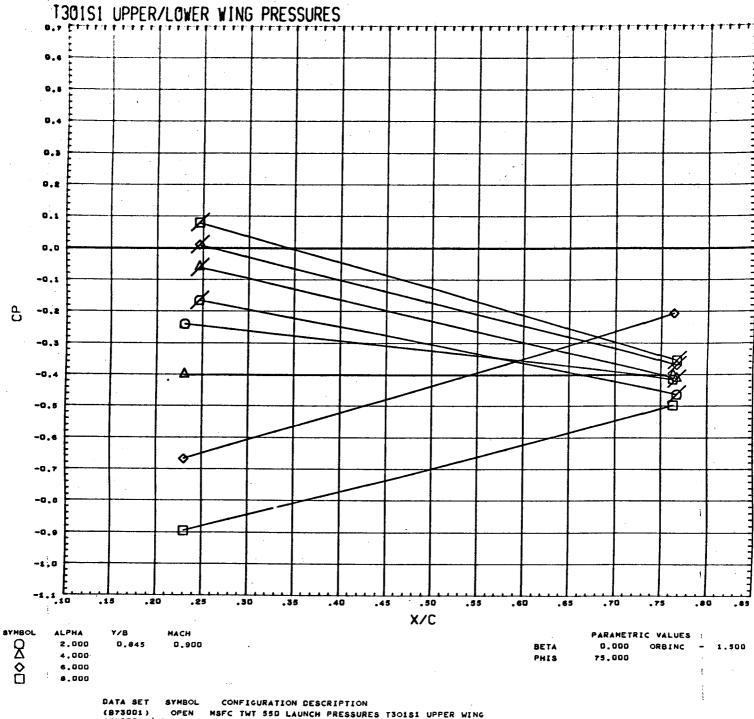


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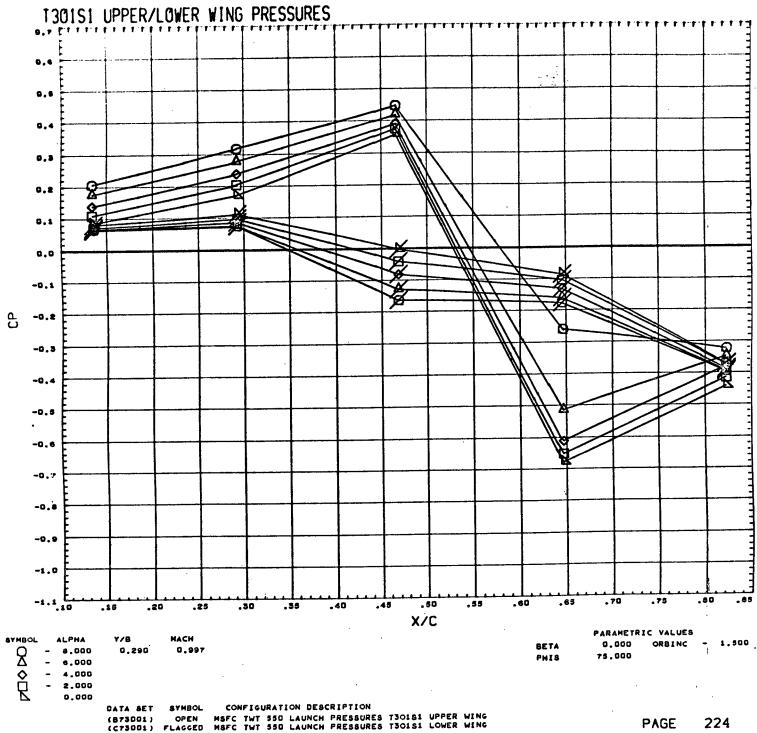
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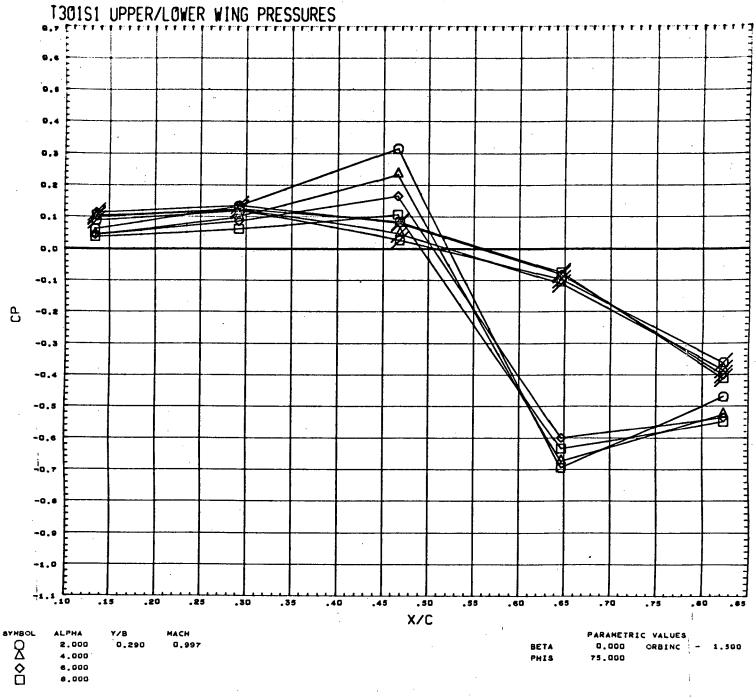
(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING





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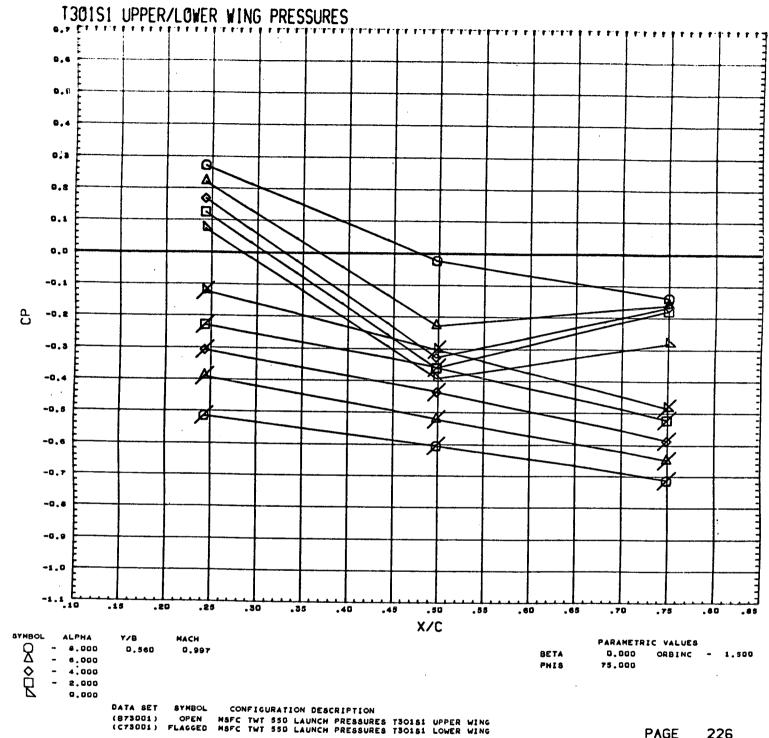


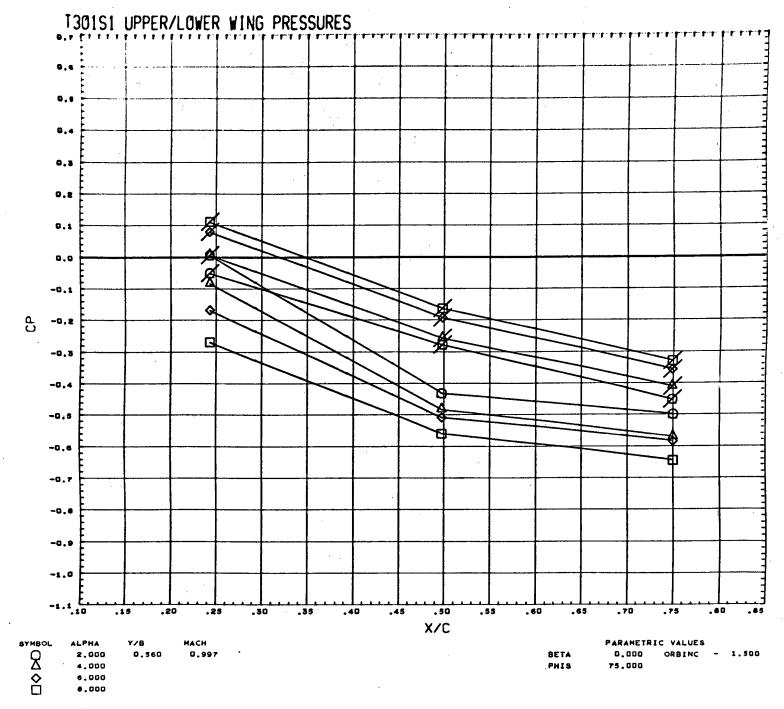


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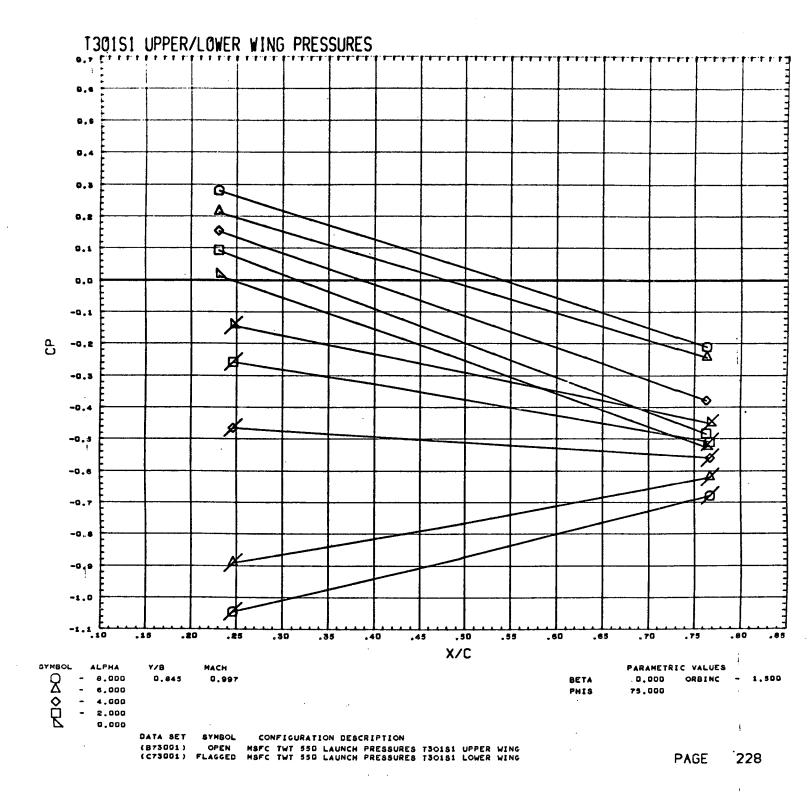
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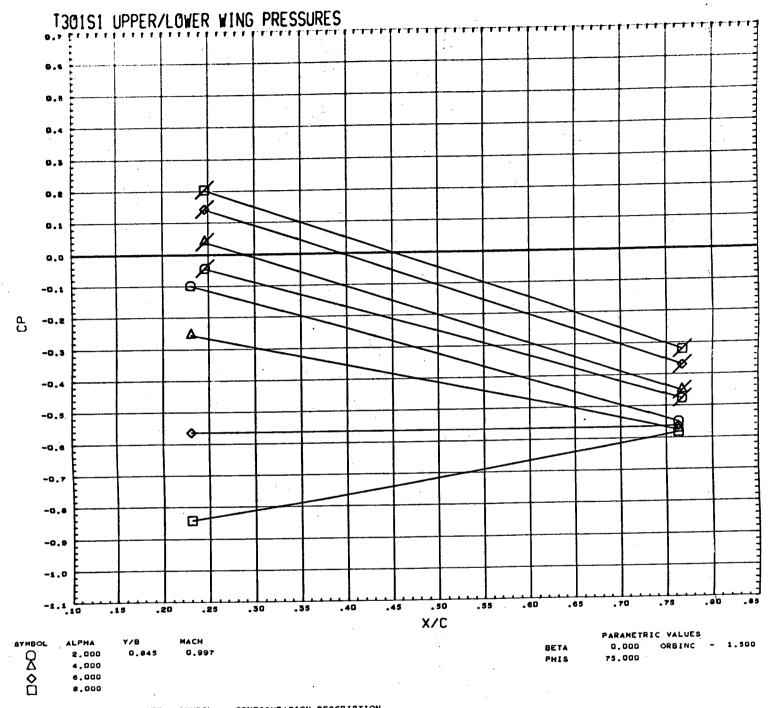




DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

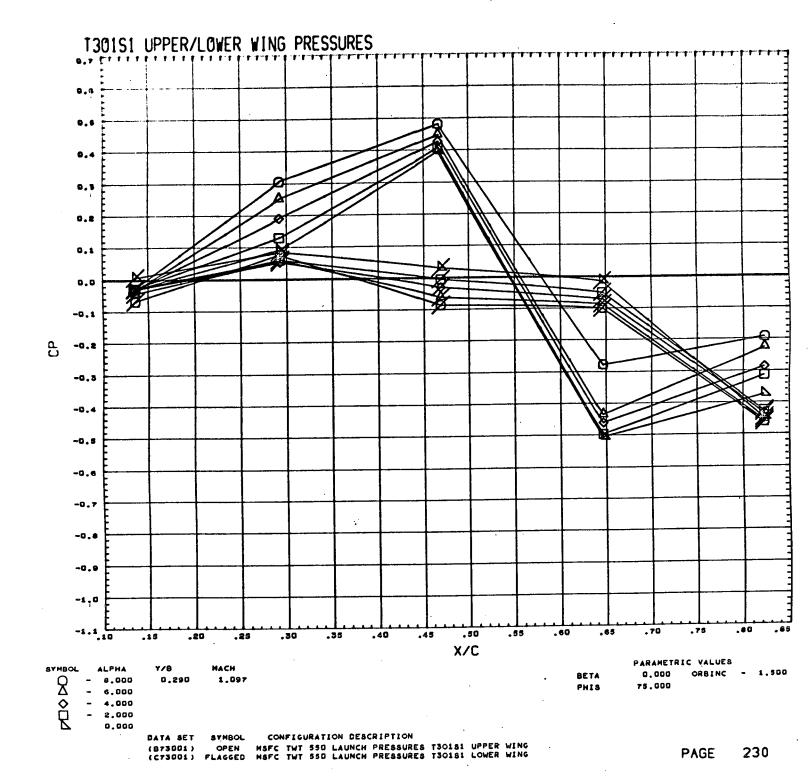


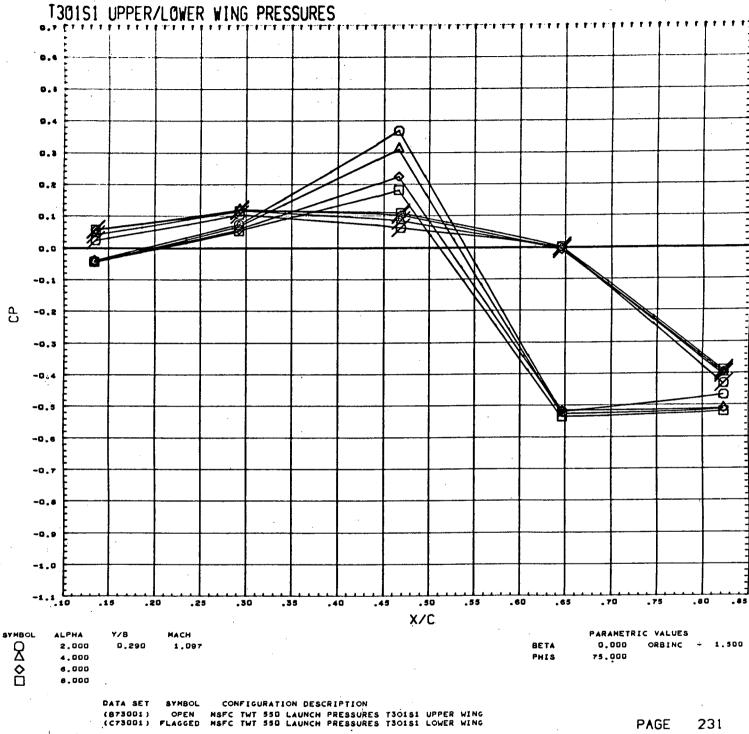


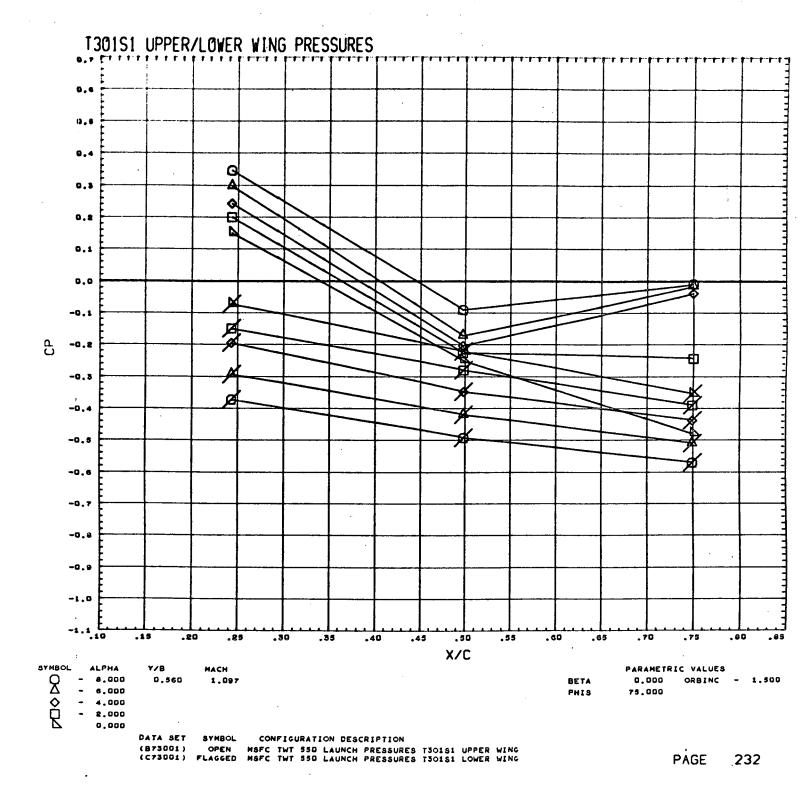
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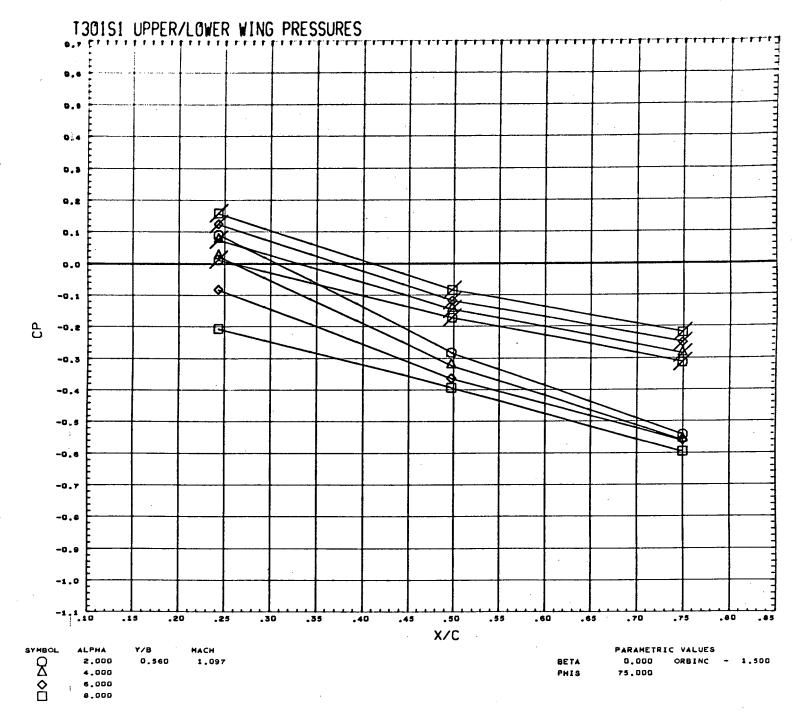
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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



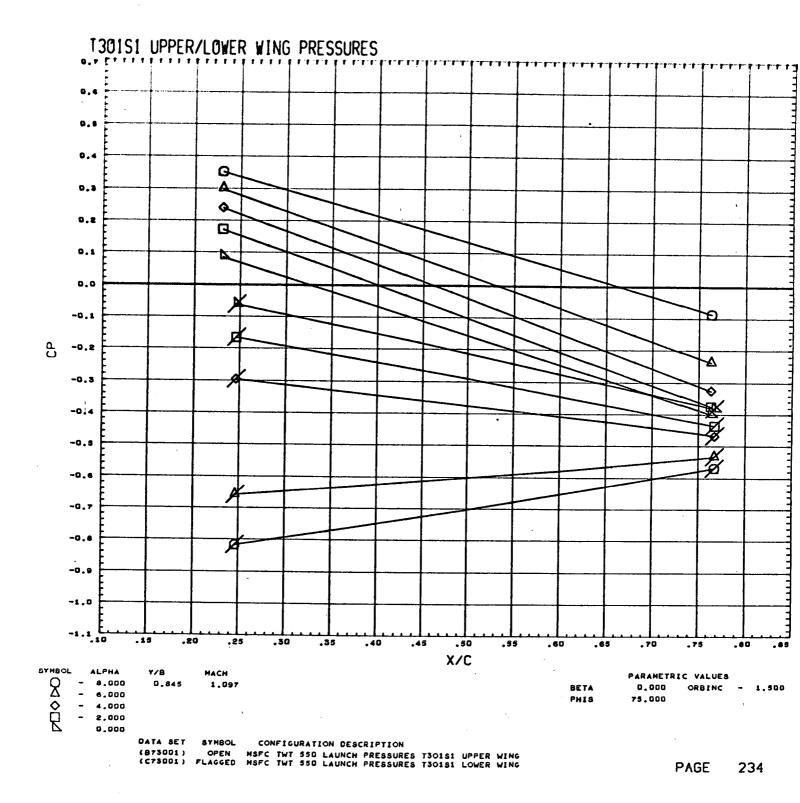


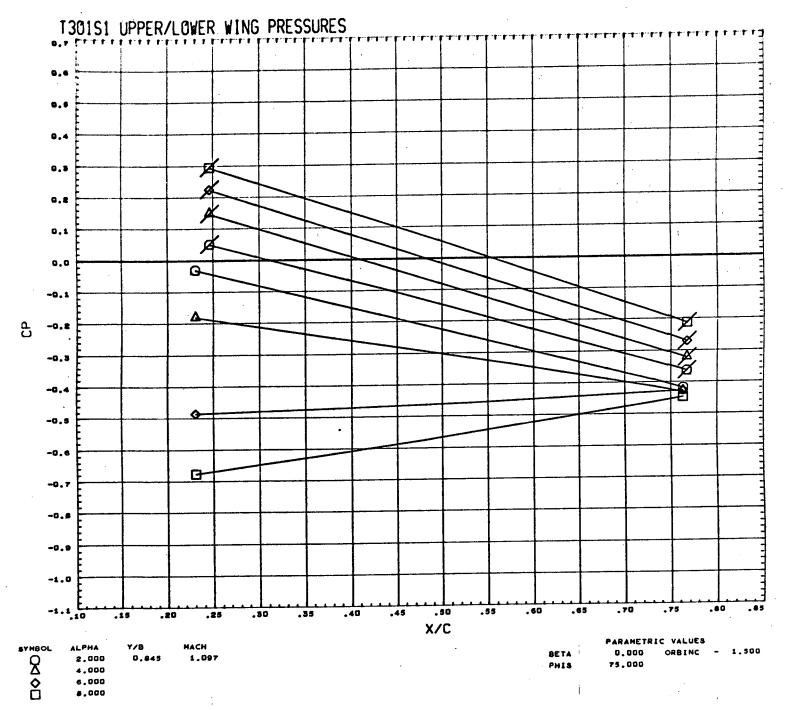




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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

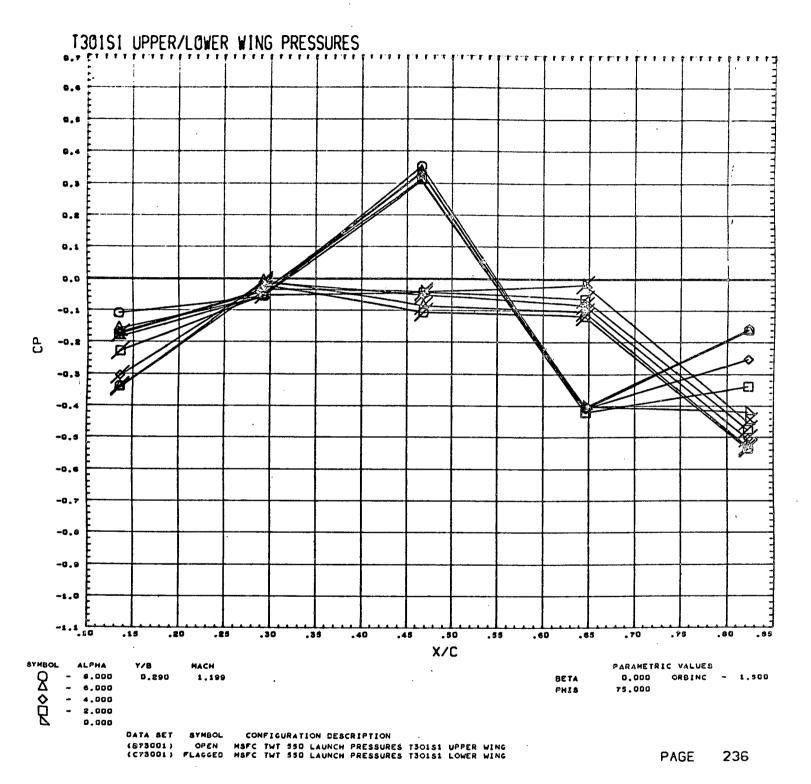


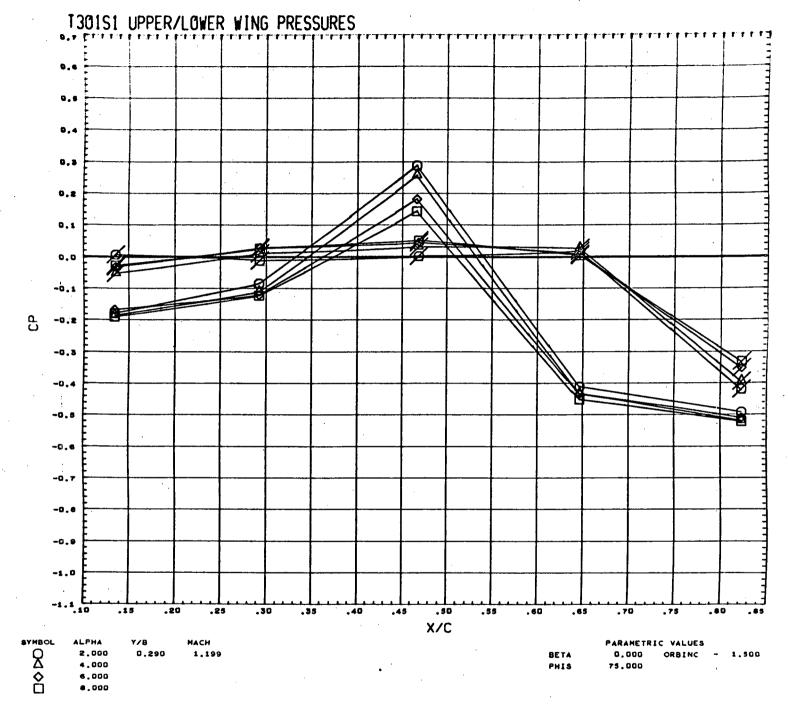


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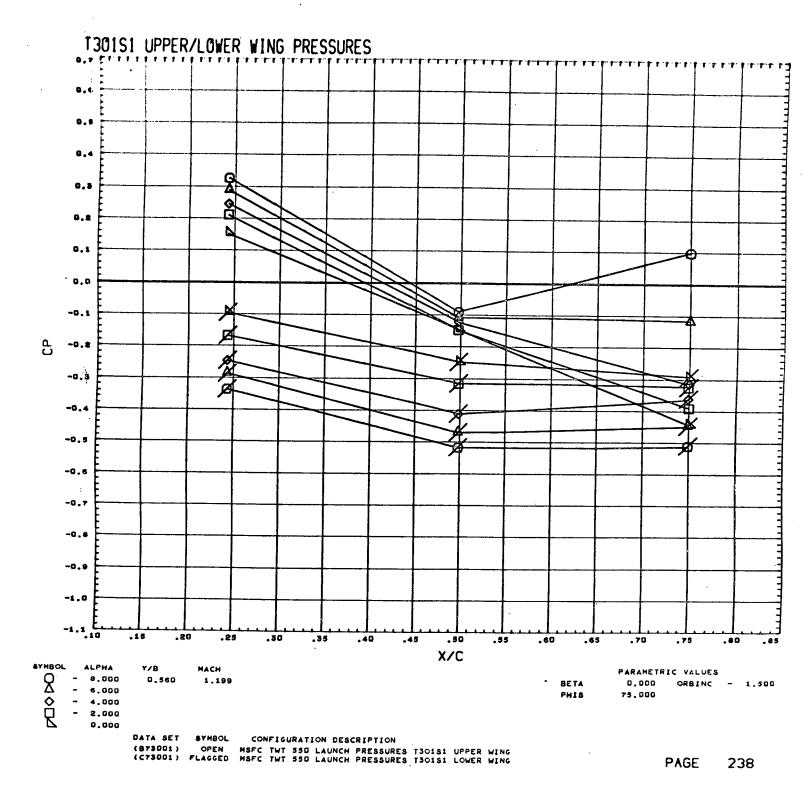
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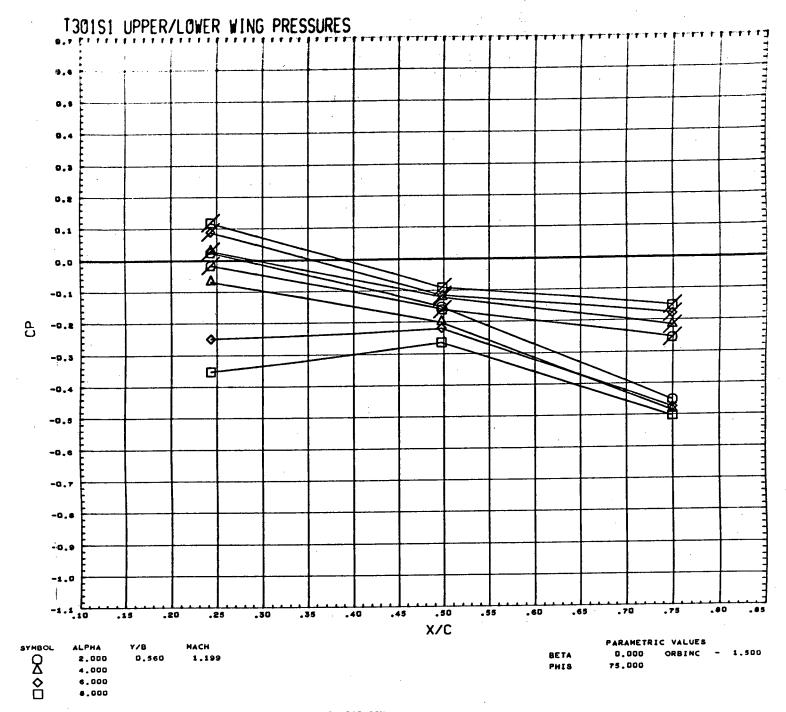
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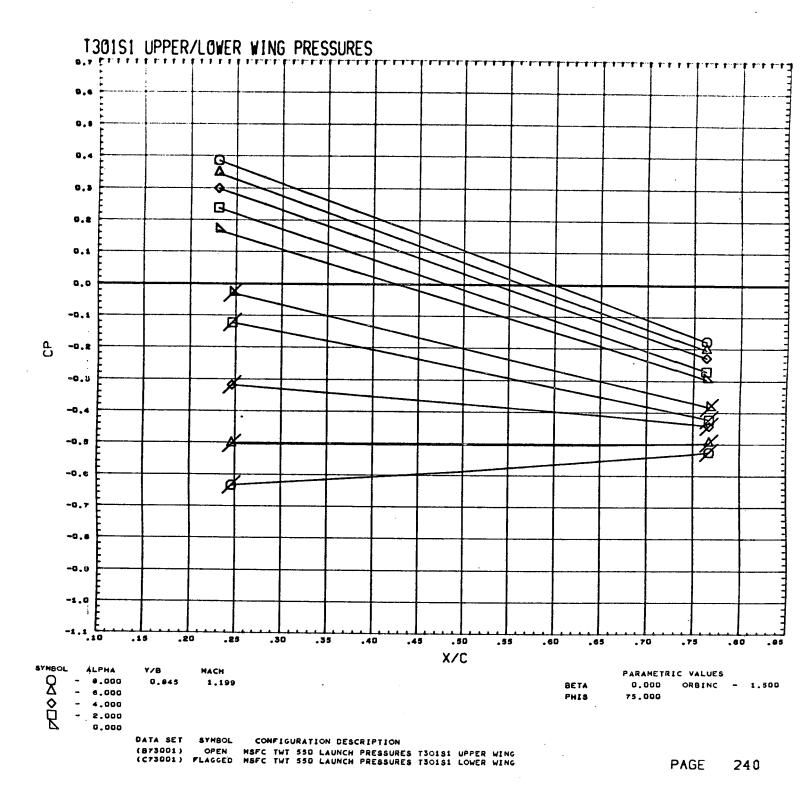
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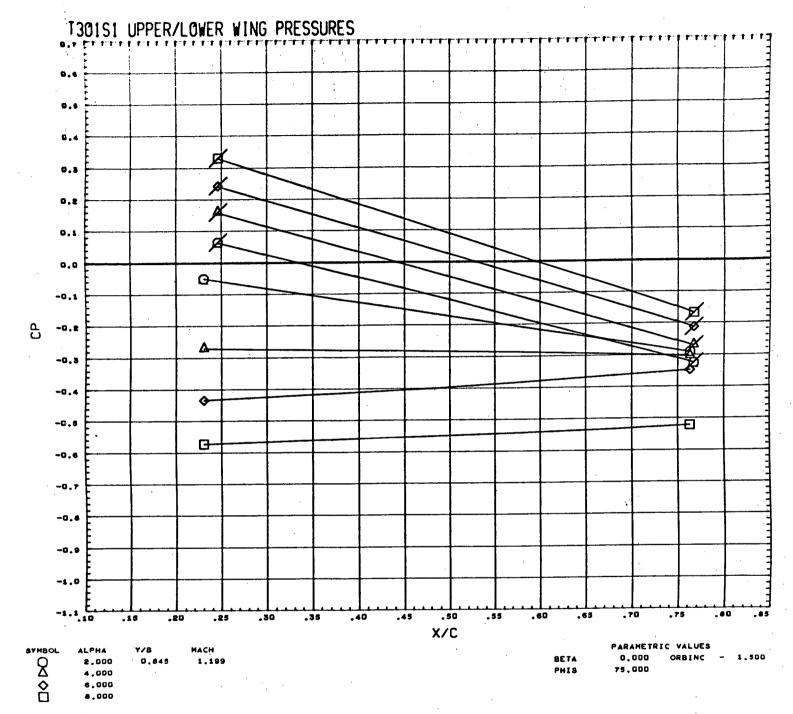




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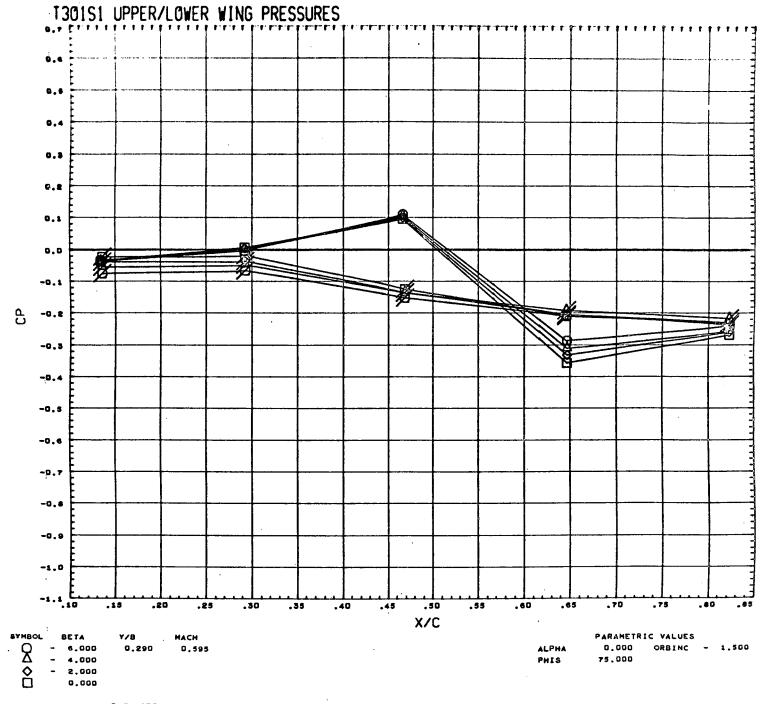
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(C73001) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



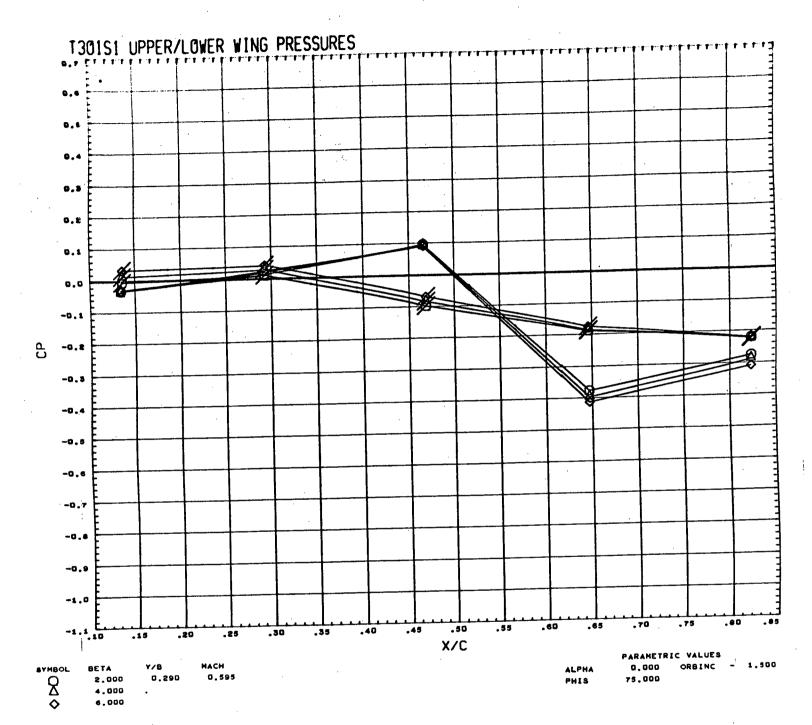


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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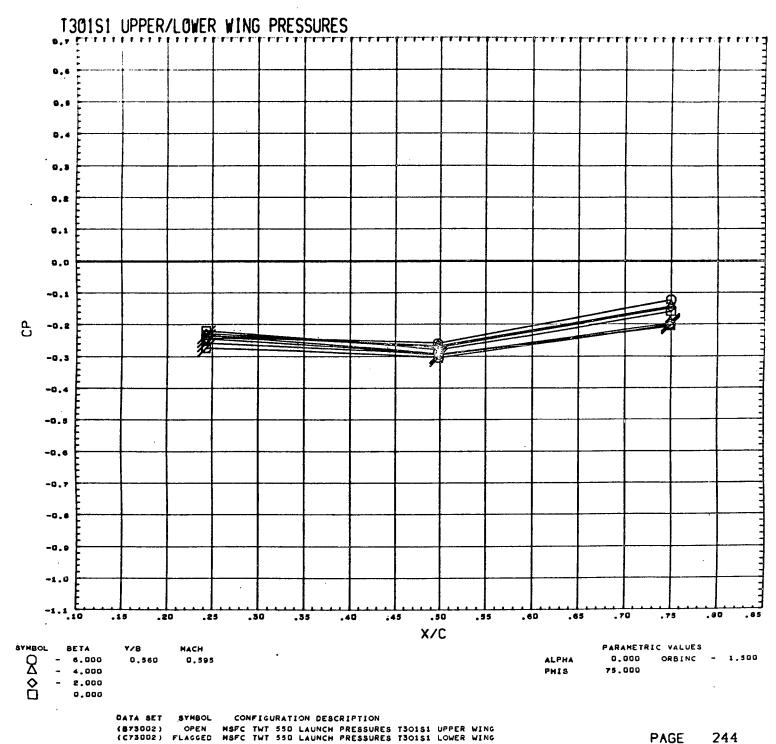
DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

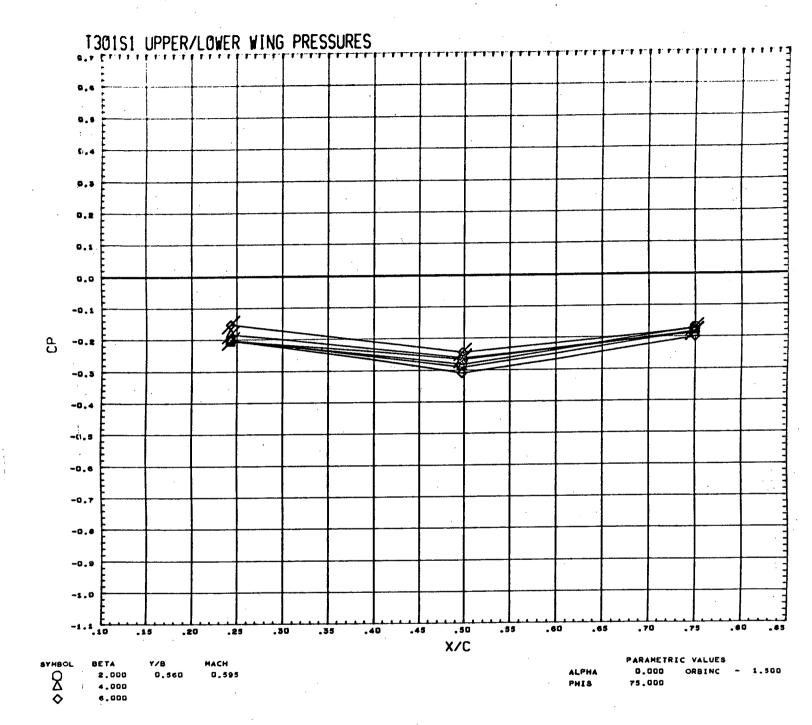


DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73002) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

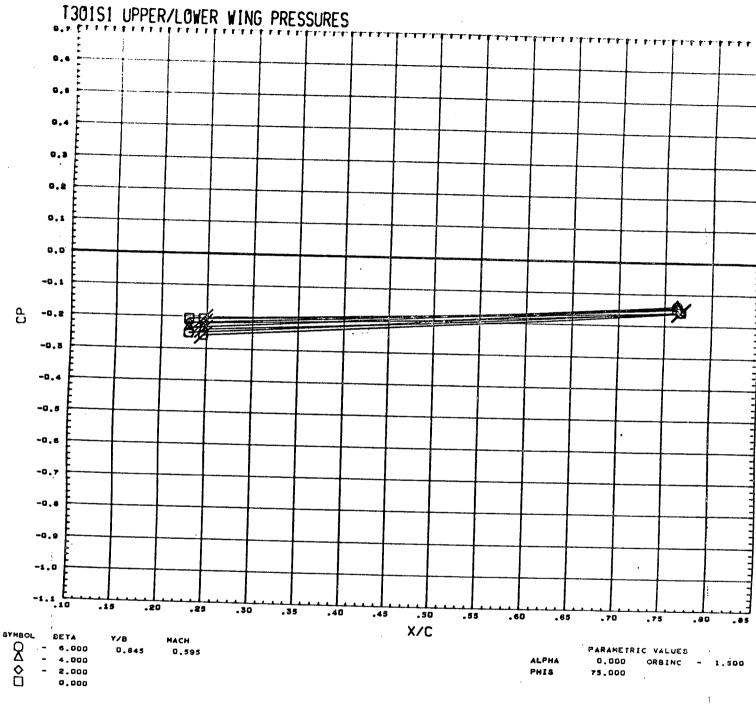
(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING





DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873002) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



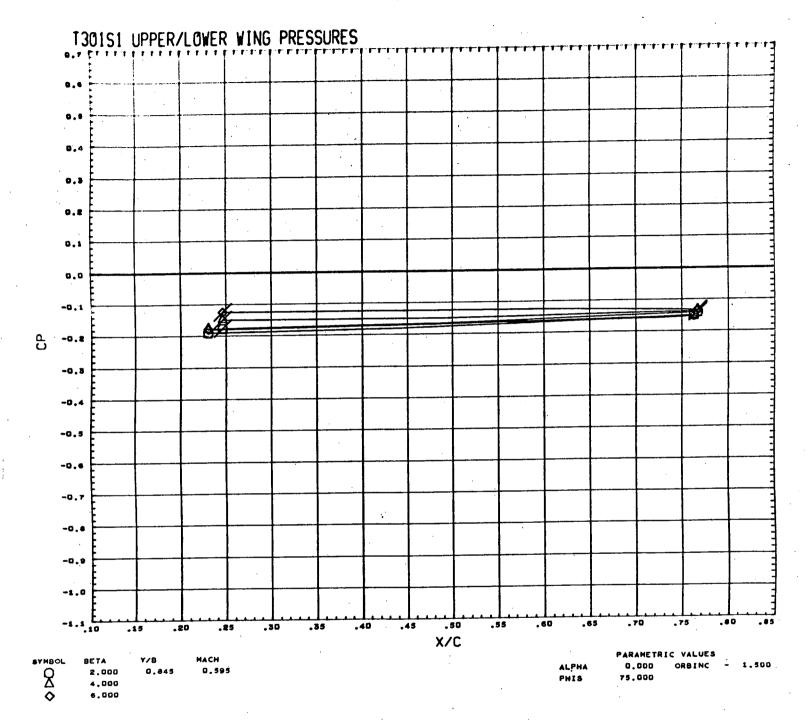
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(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

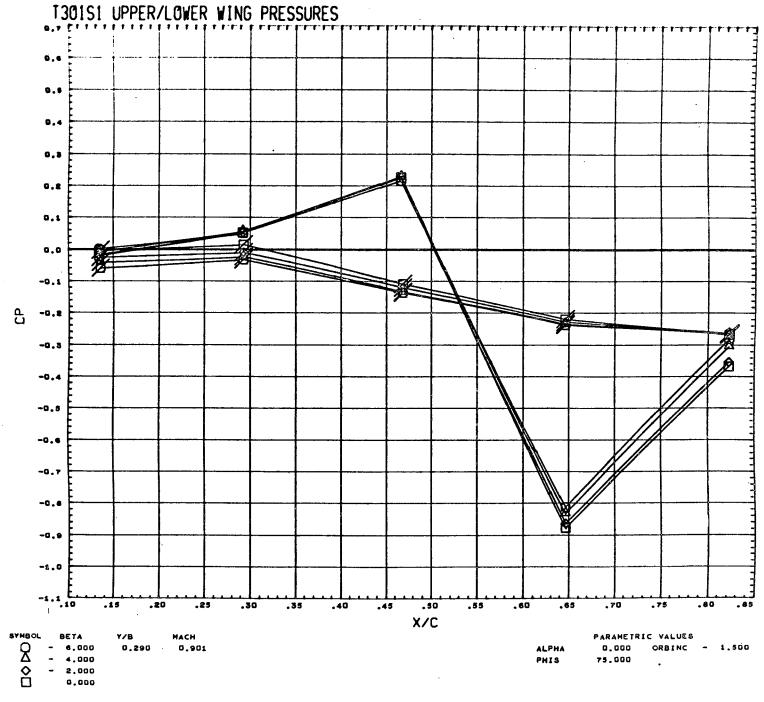
PAGE 246

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DATA SET SYMBOL CONFIGURATION DESCRIPTION

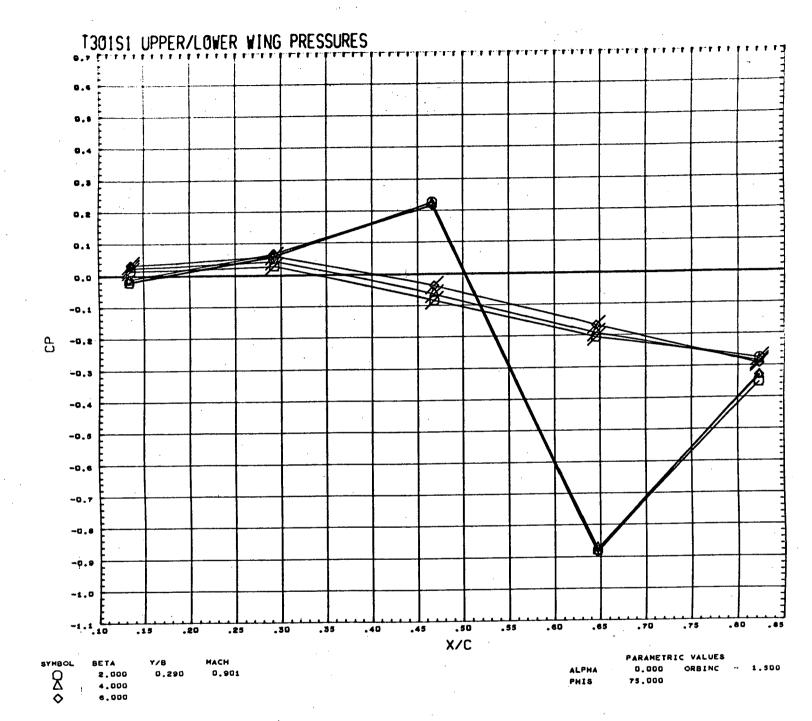
(873002) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING
(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

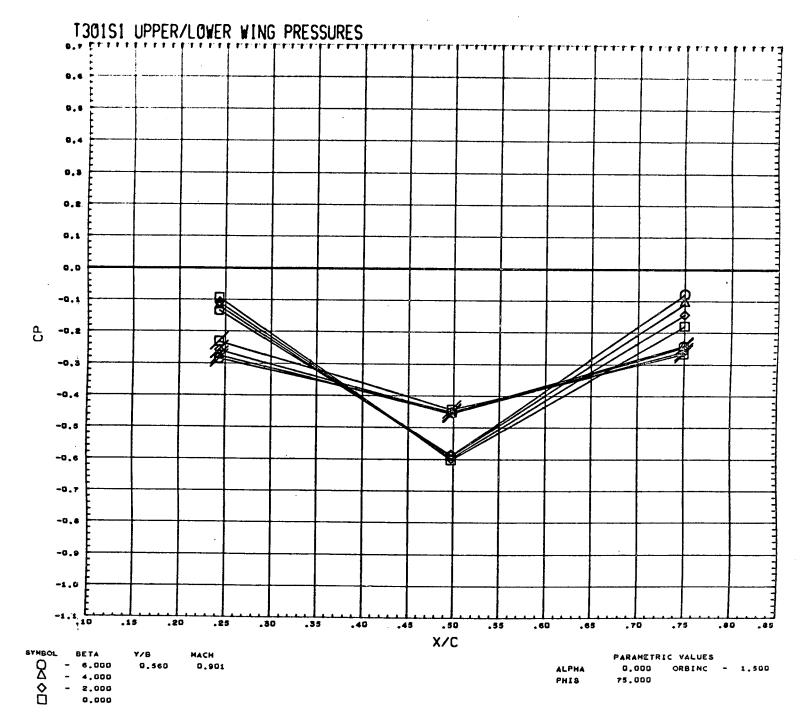
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(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

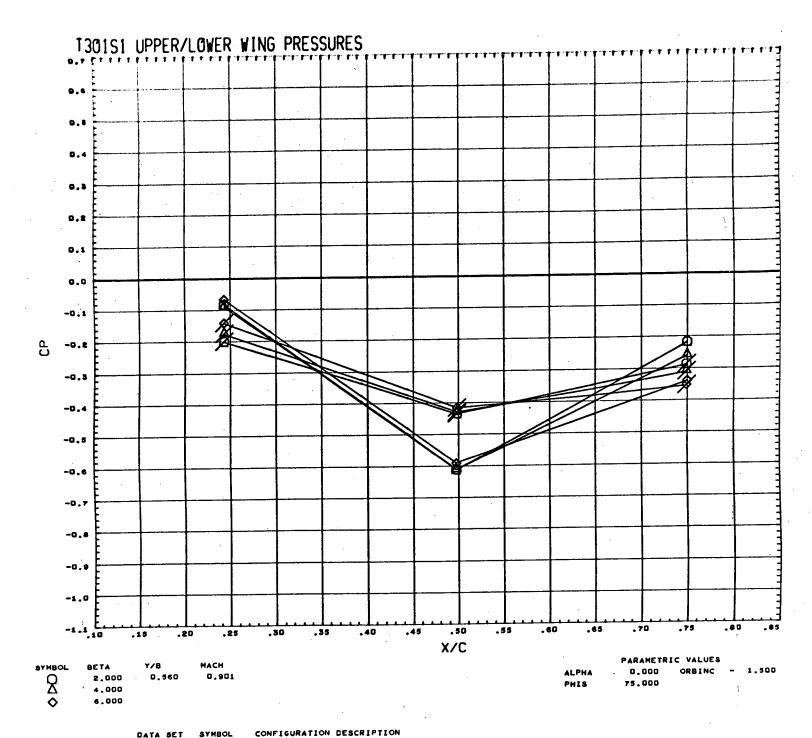


DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73DD2) OPEN MSFC TWT 55D LAUNCH PRESSURES T301S1 UPPER WING
(C73DD2) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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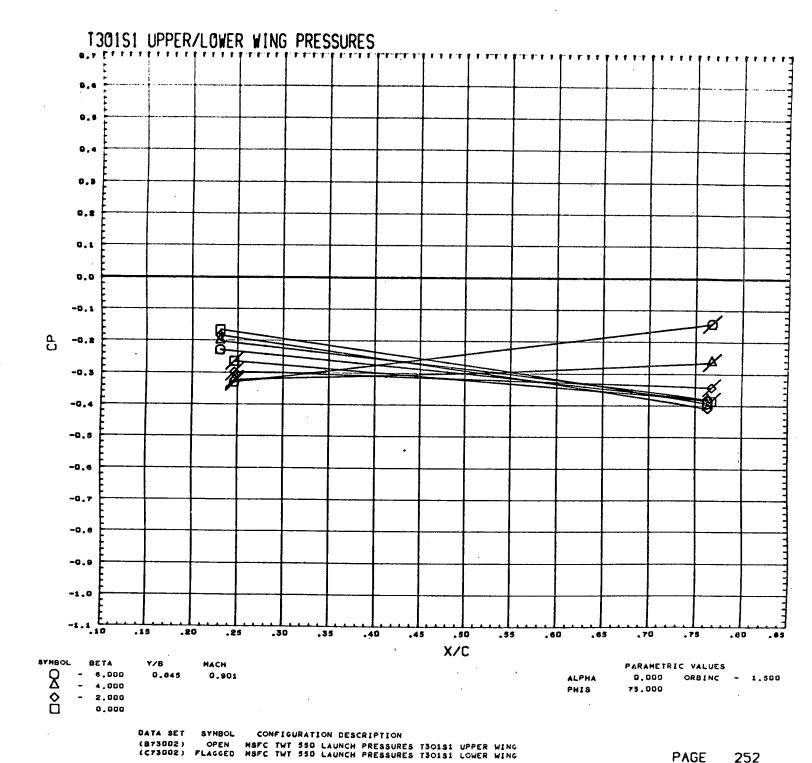


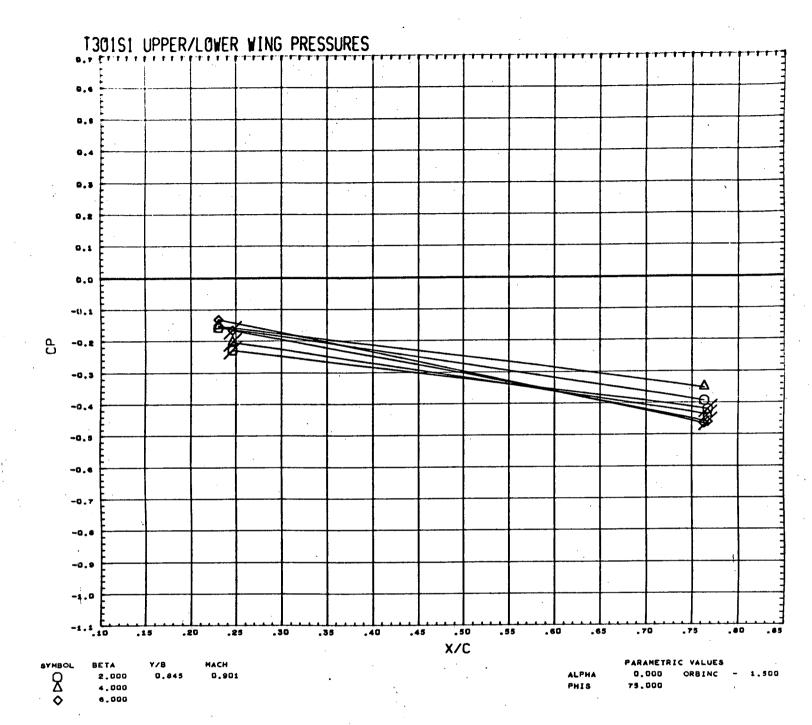
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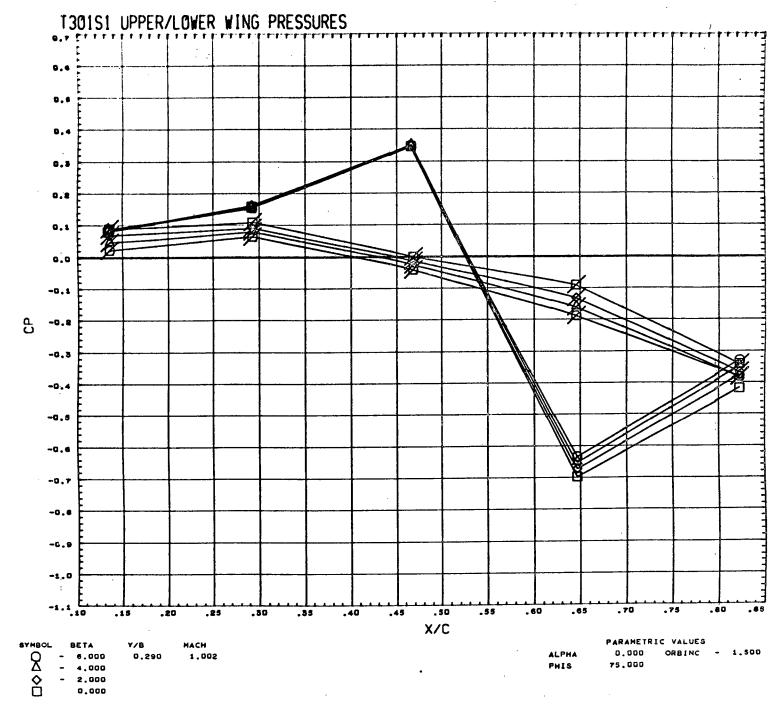
(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

PAGE 252





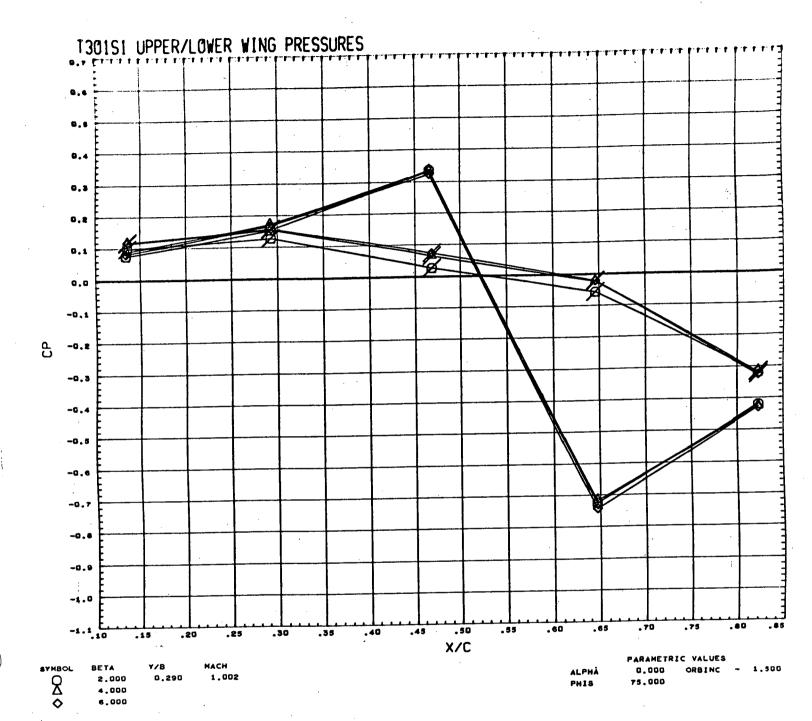
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(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

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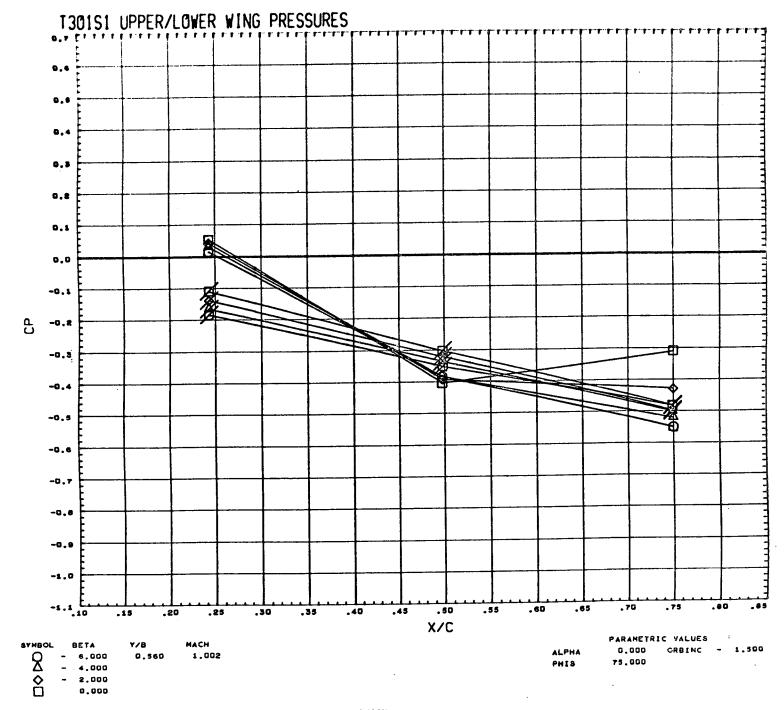
(C73002) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873002) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

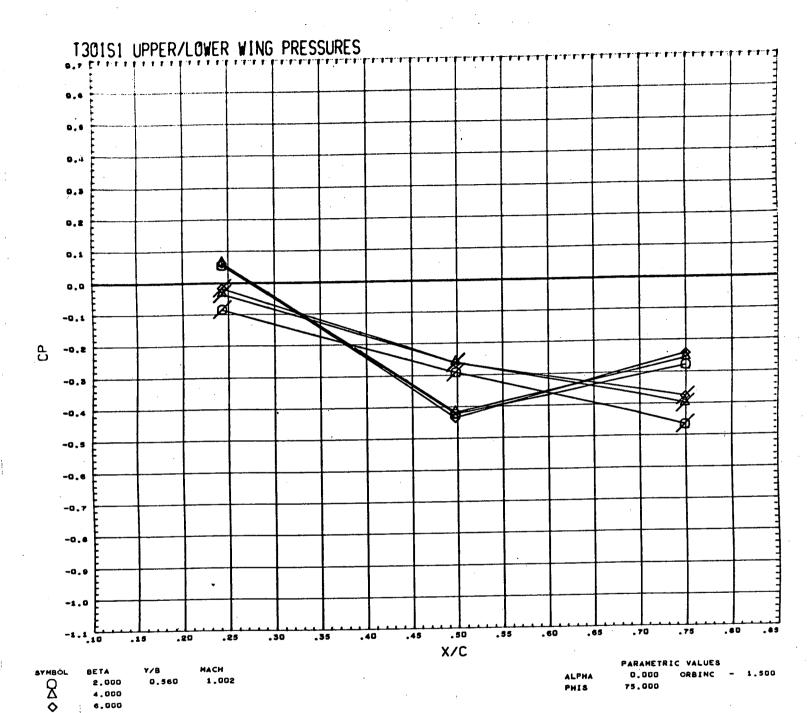
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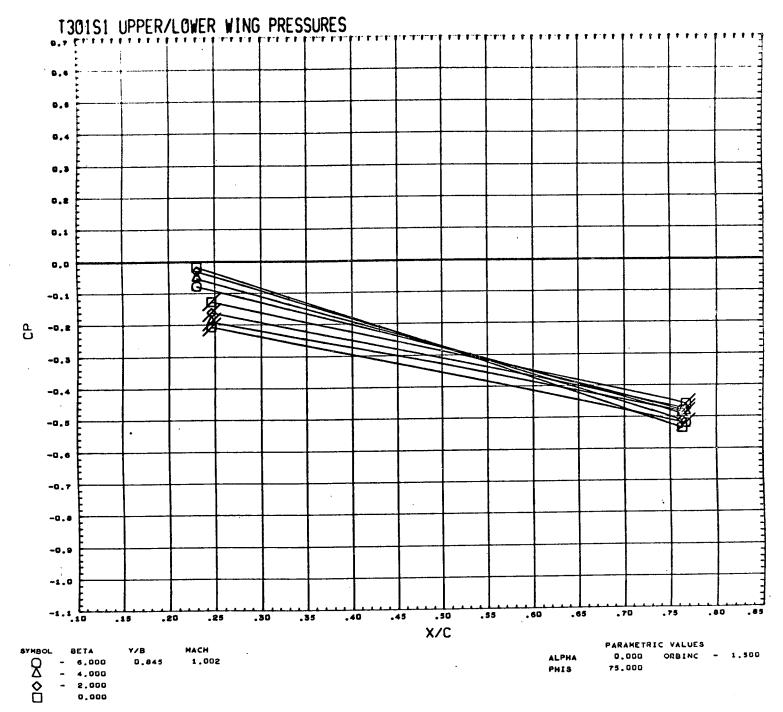


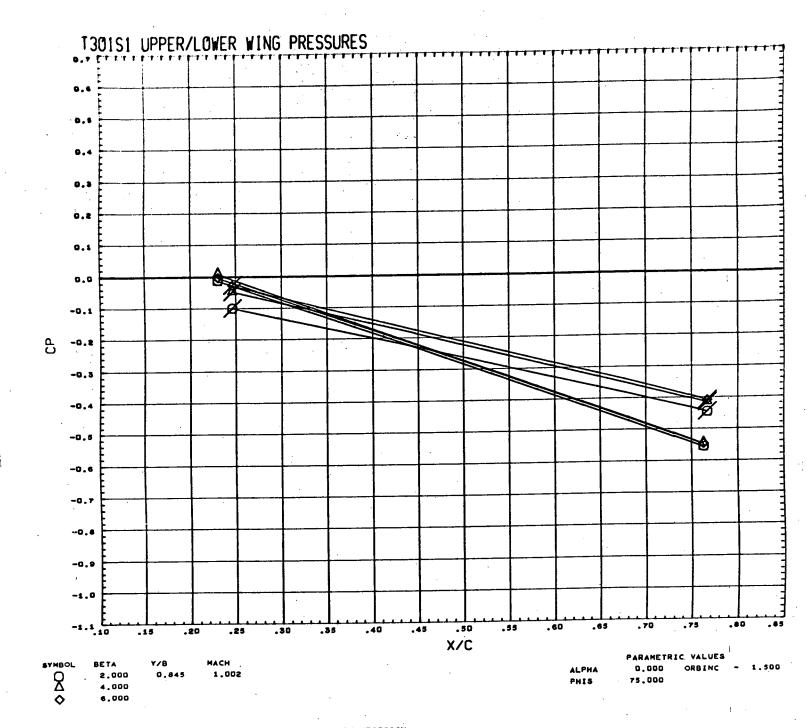
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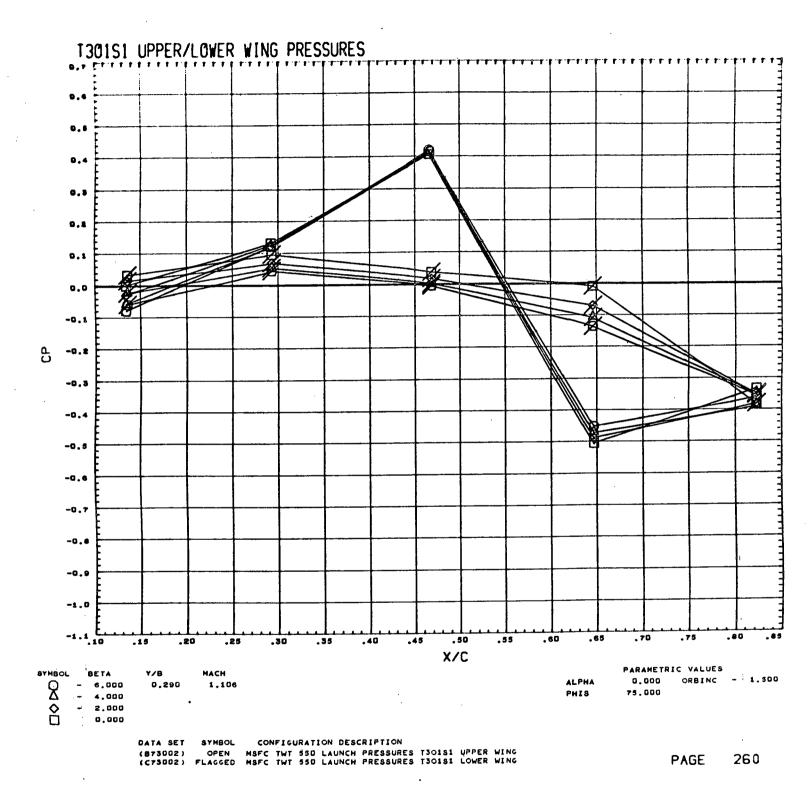
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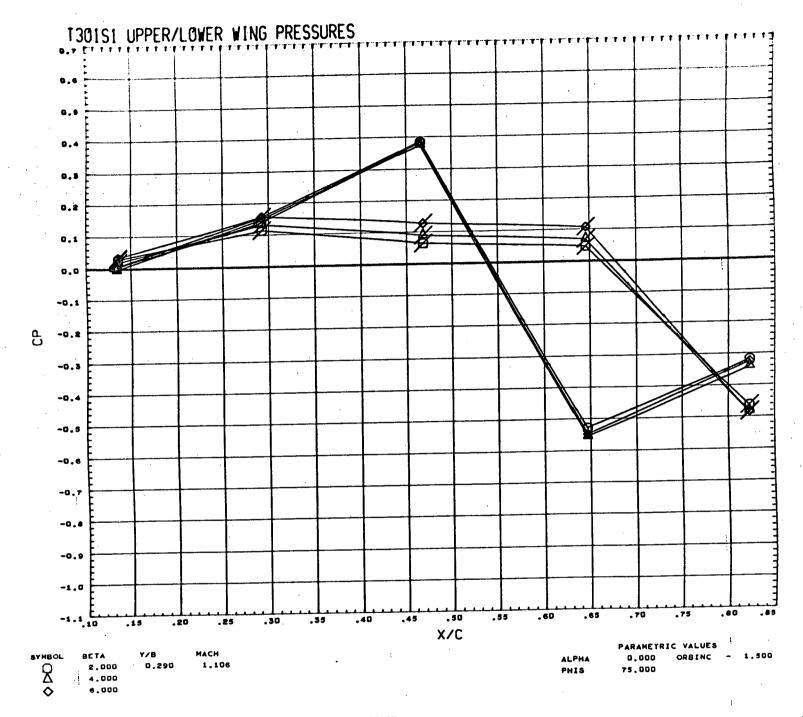


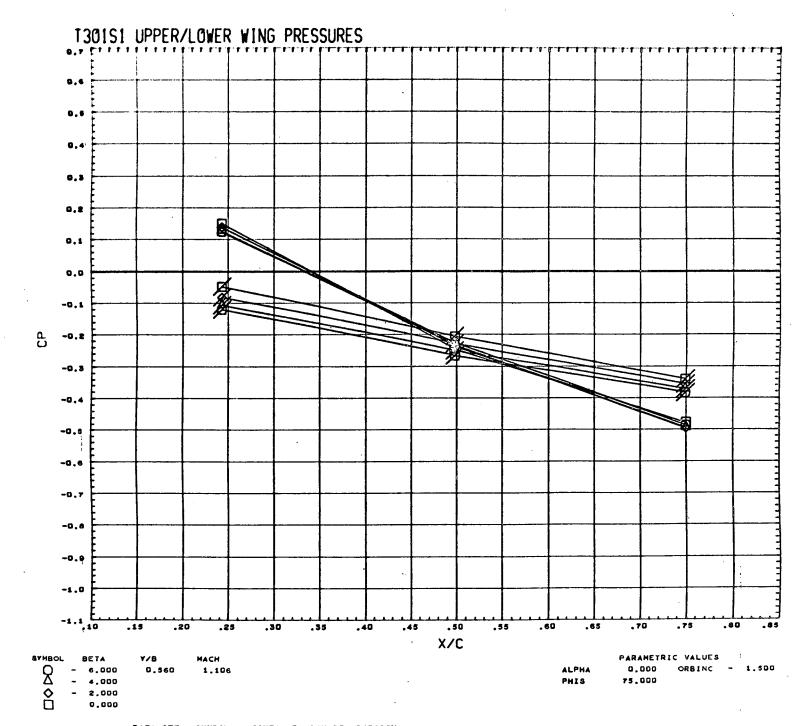


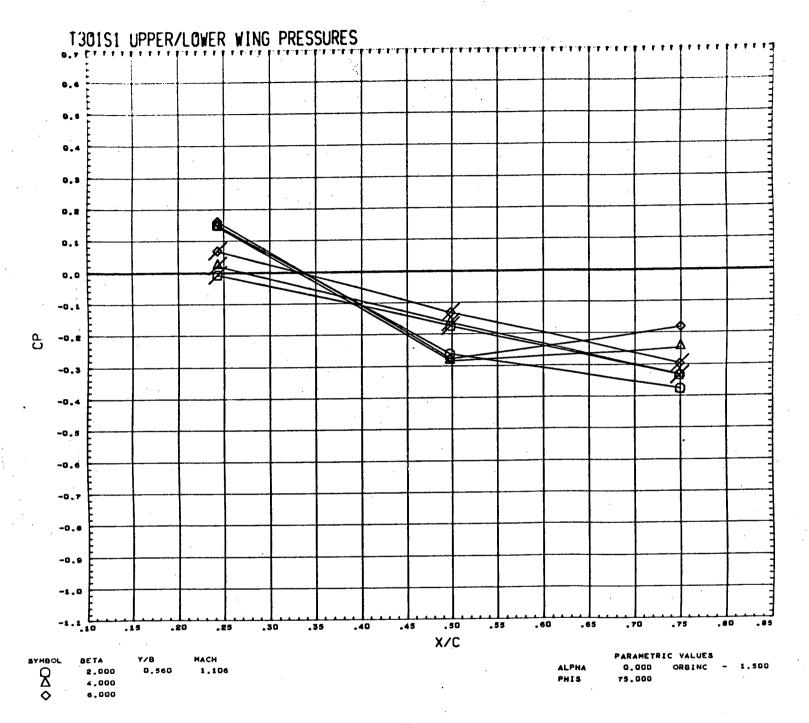


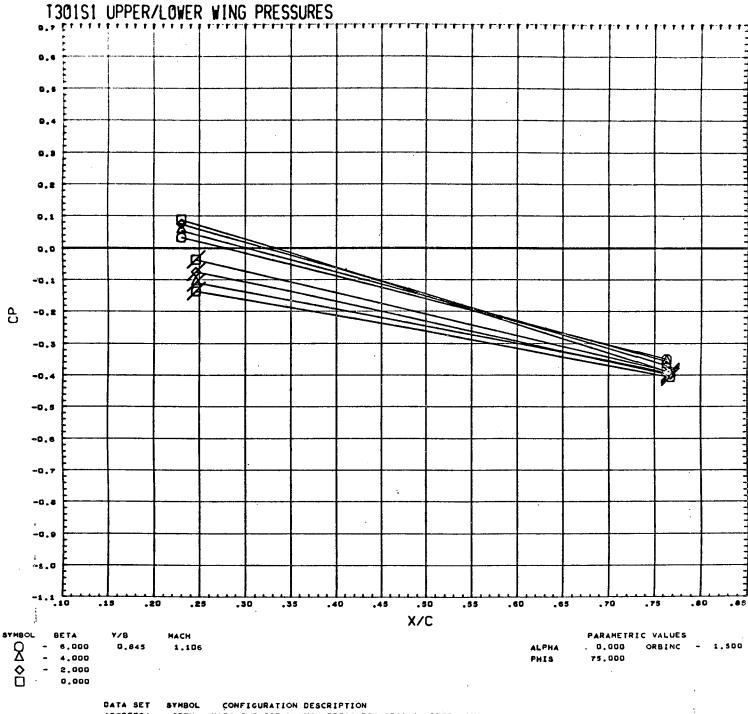
PAGE , 259

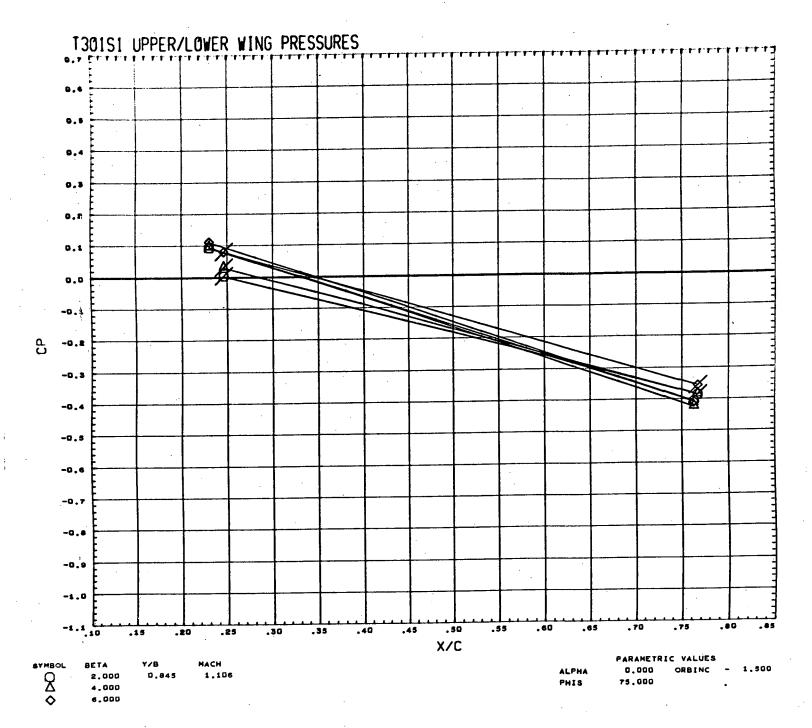


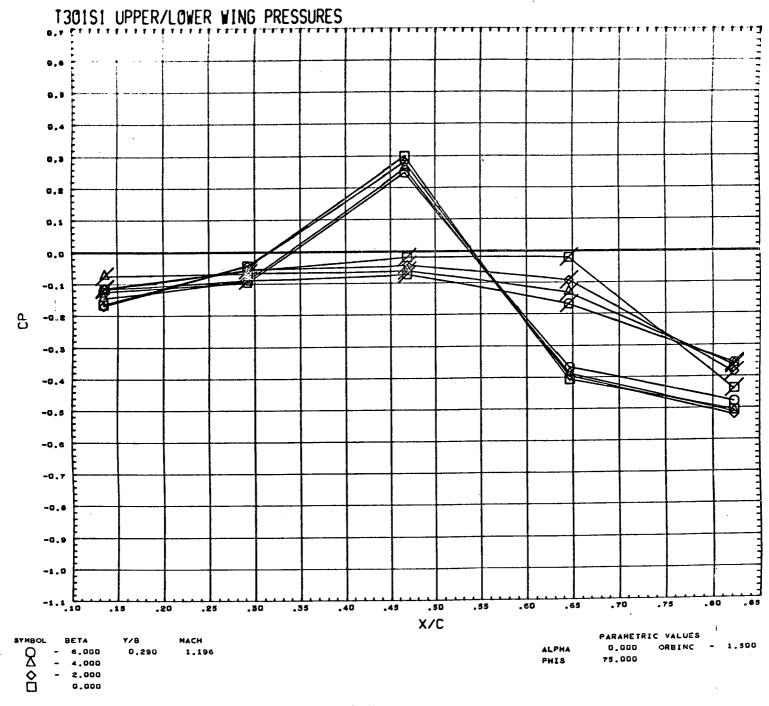


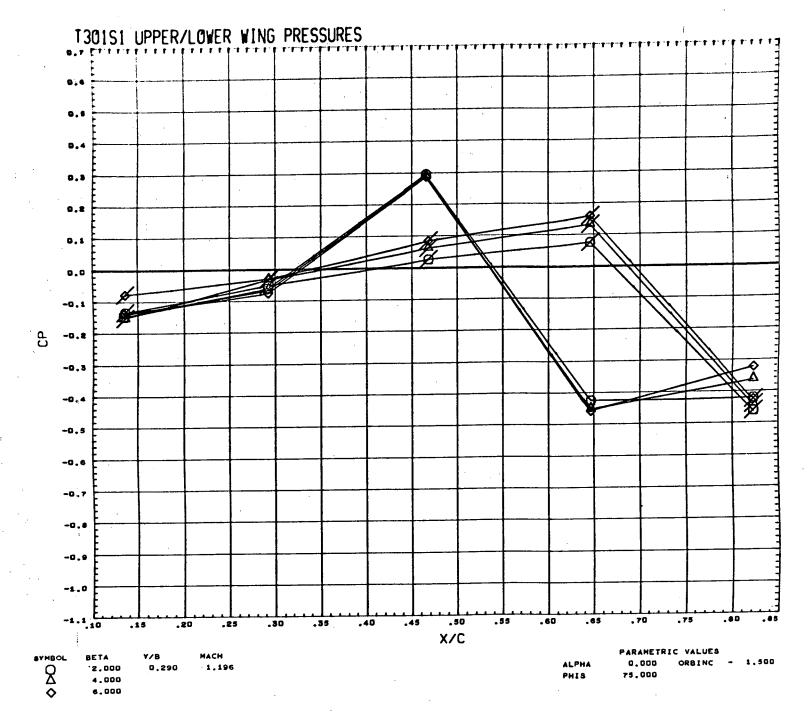


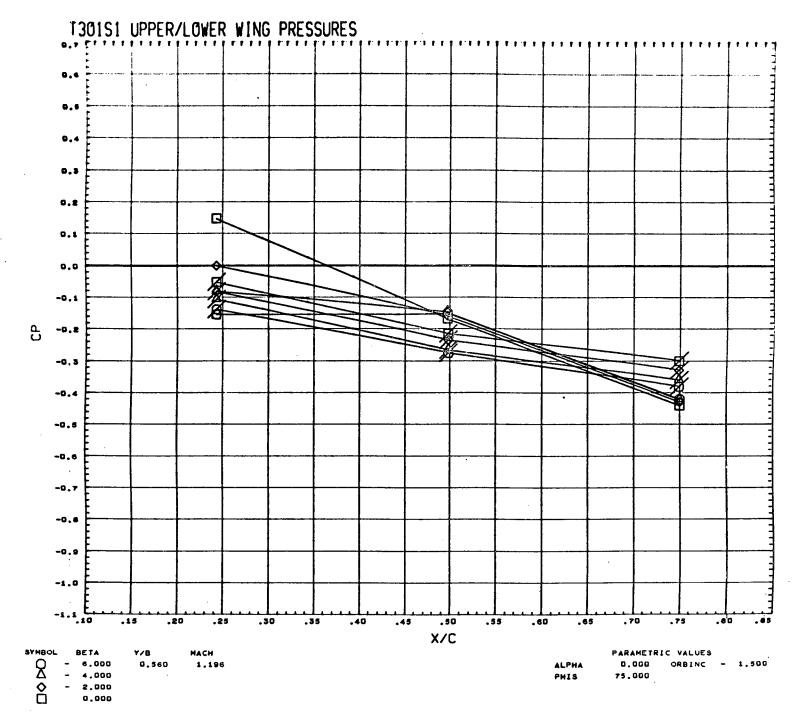


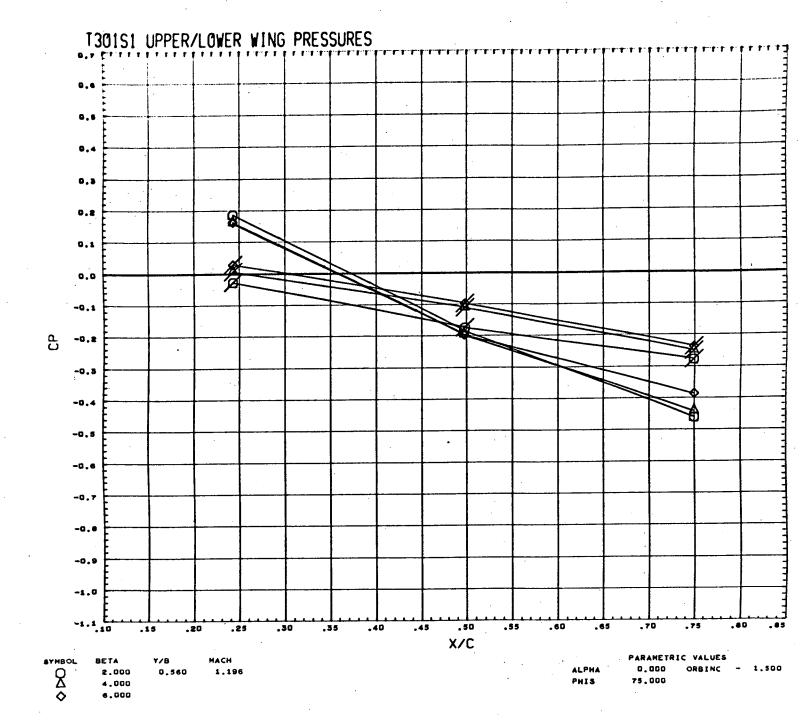


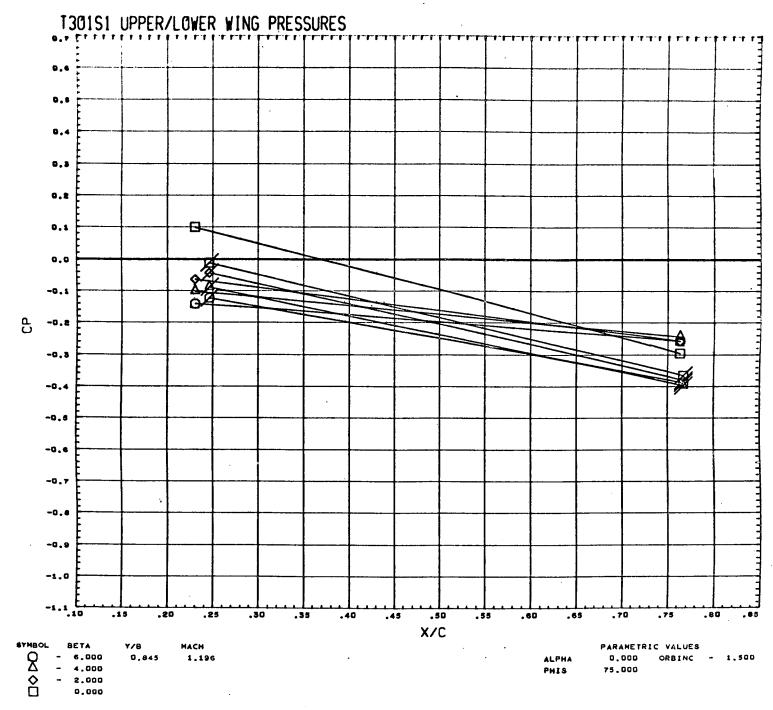


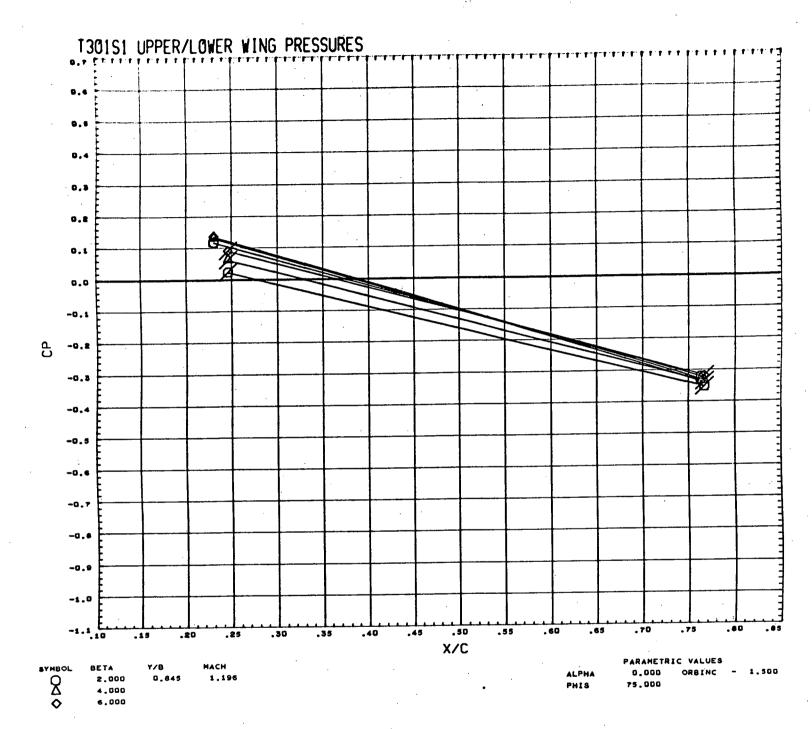


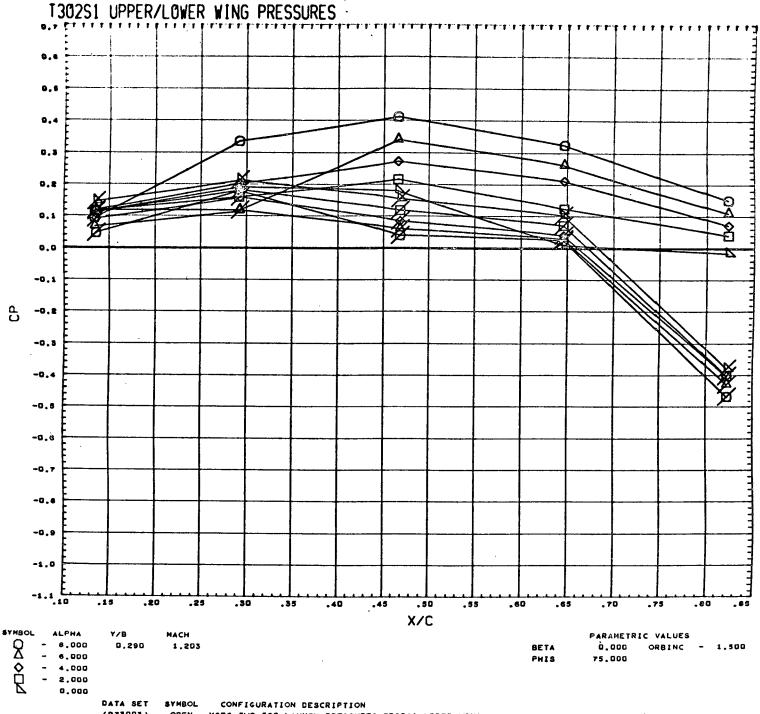


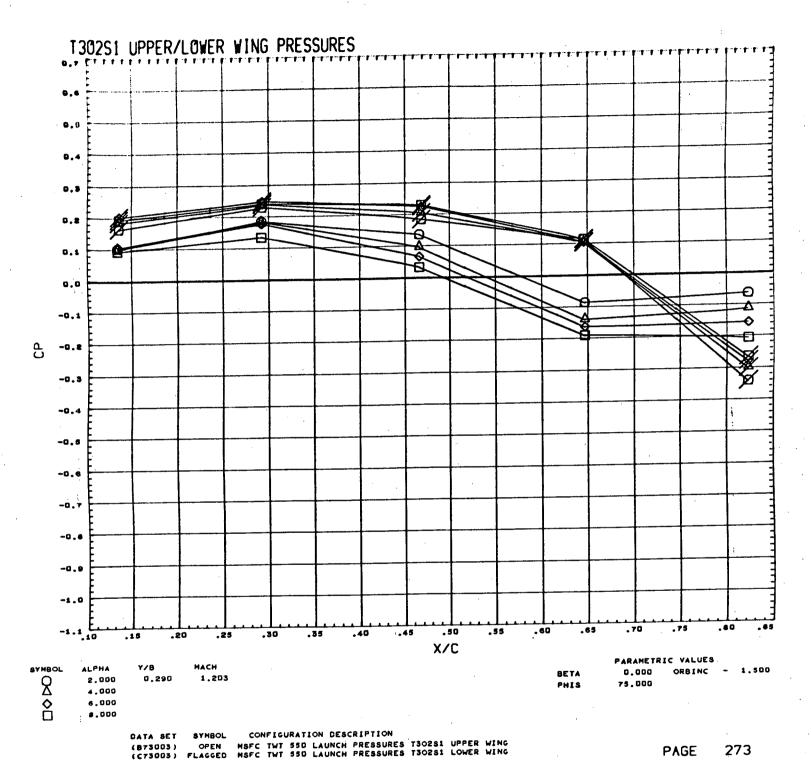


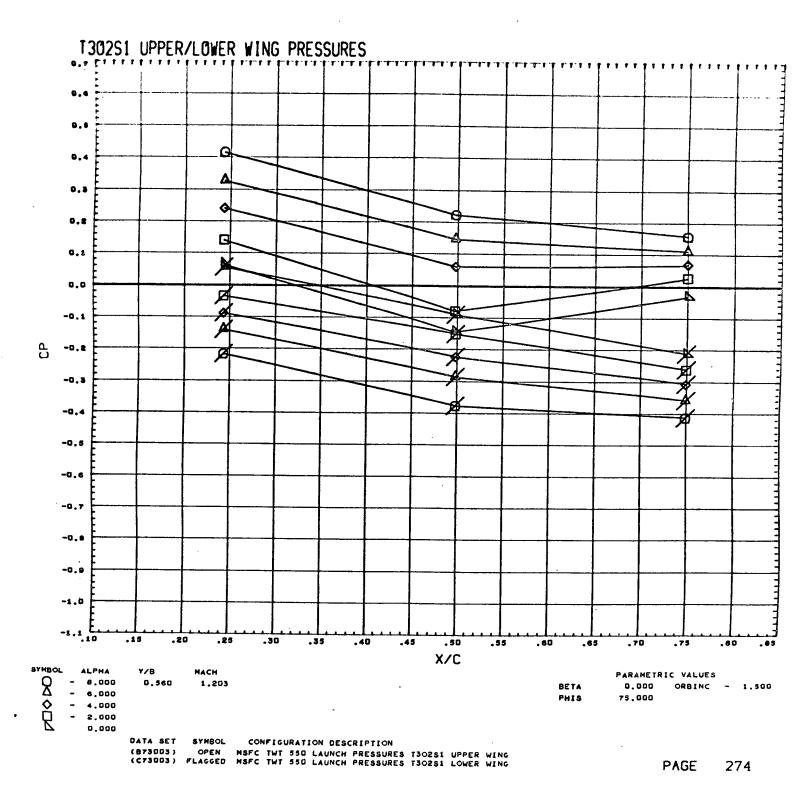


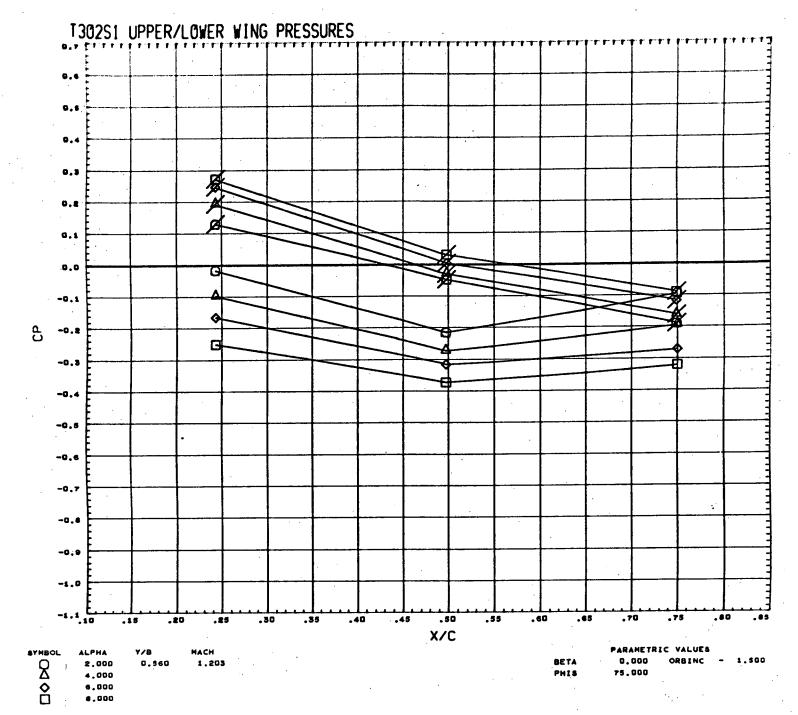


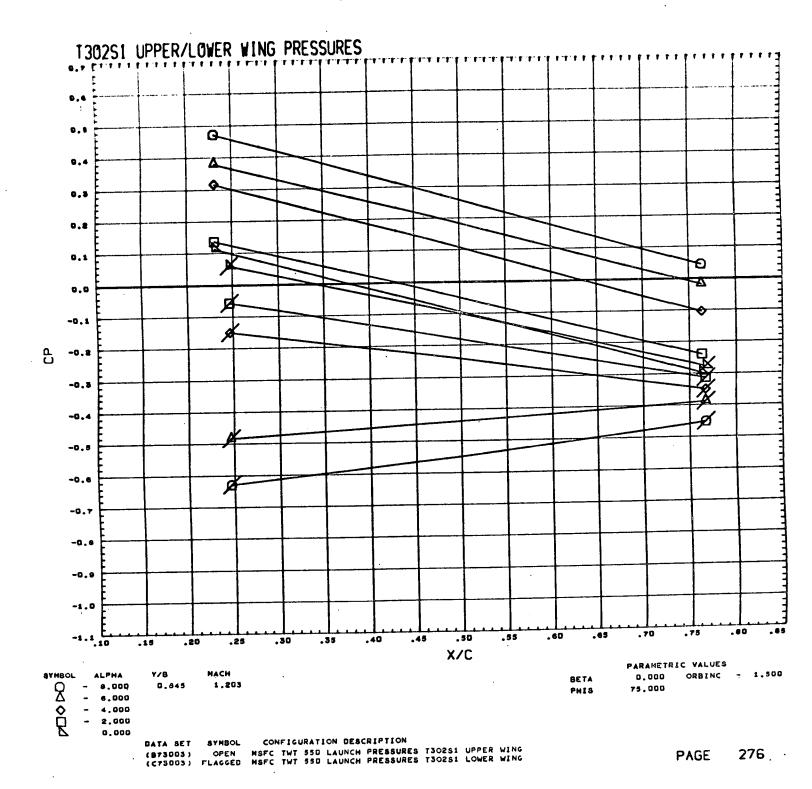


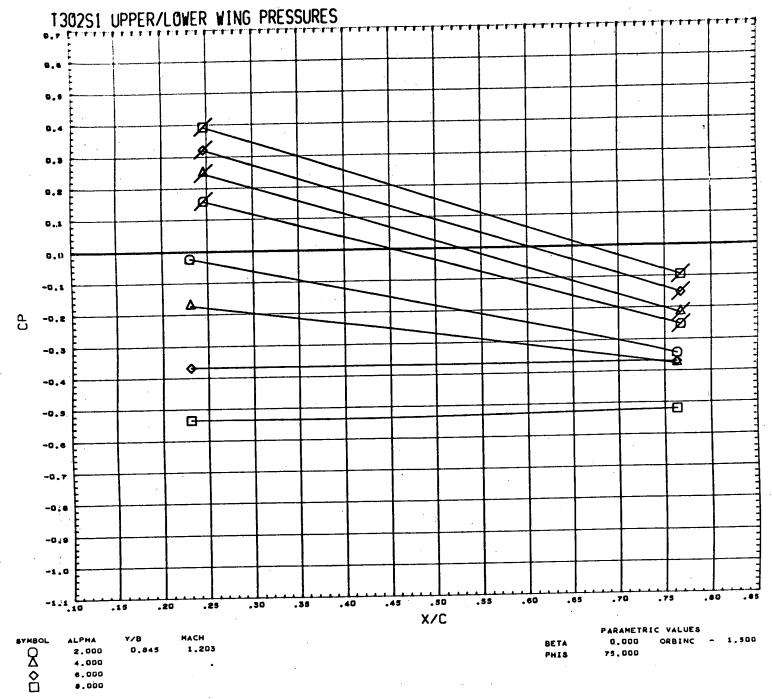


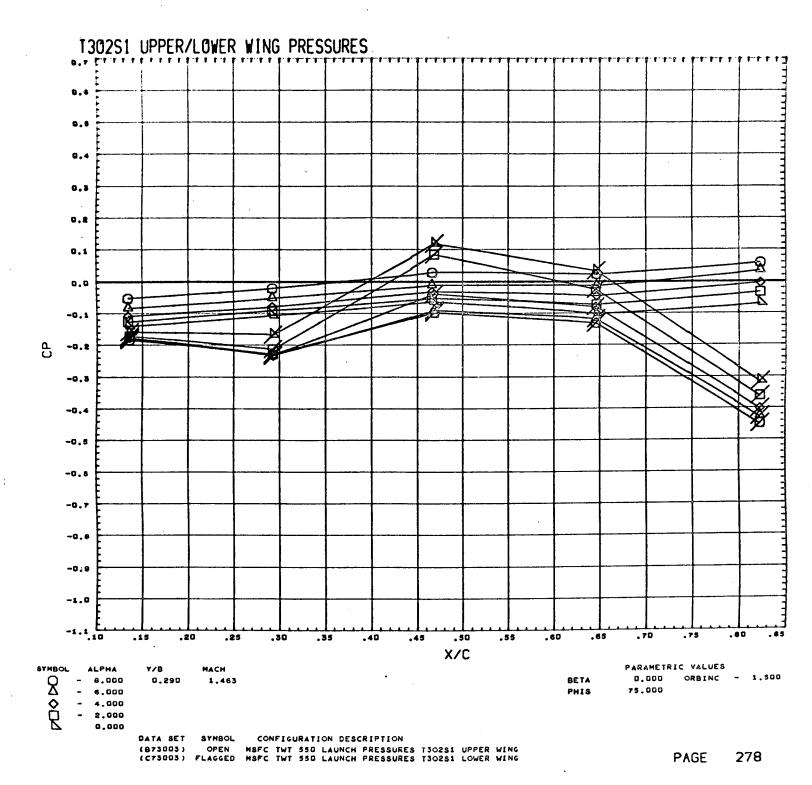


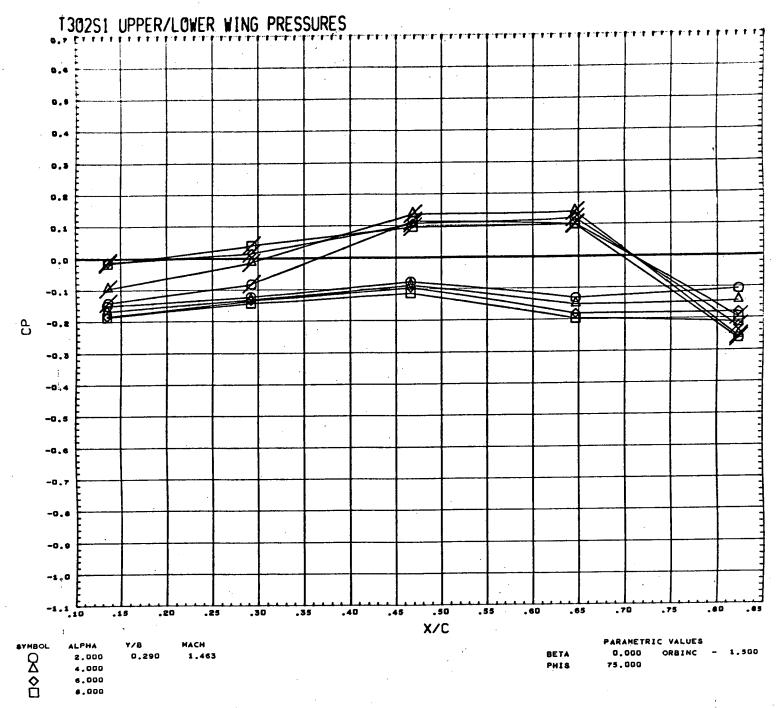


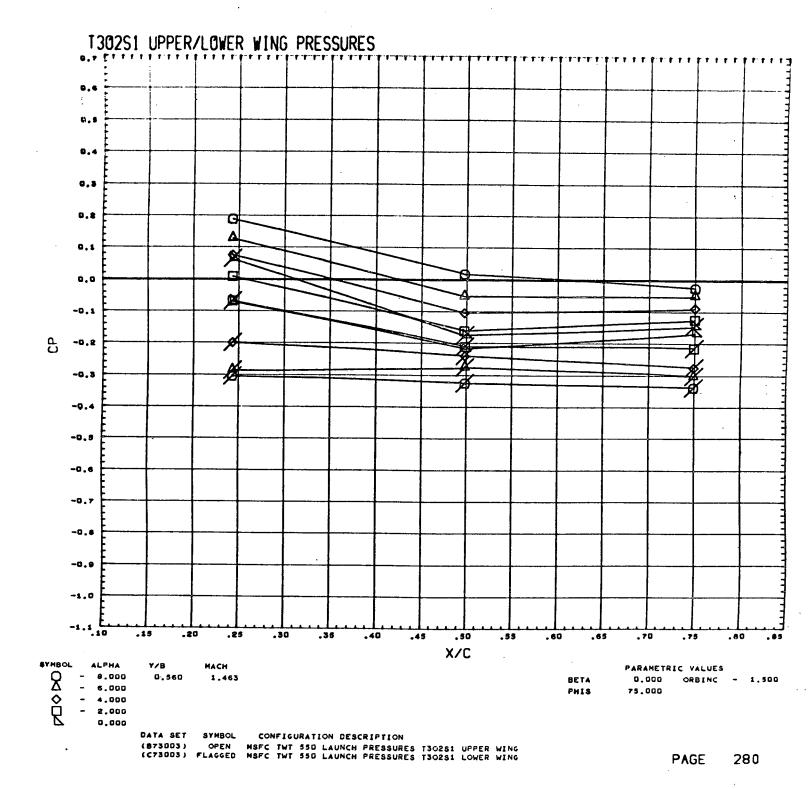


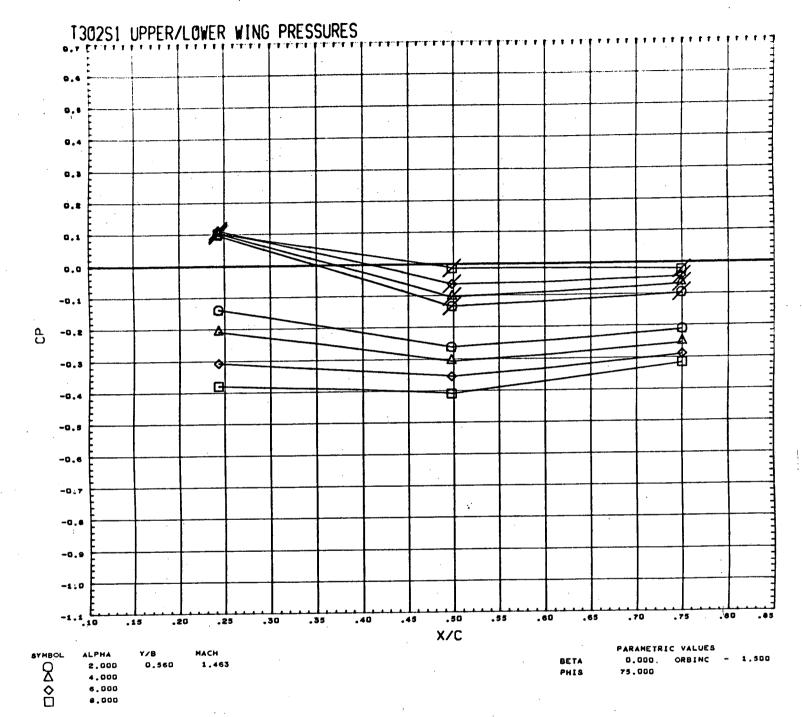


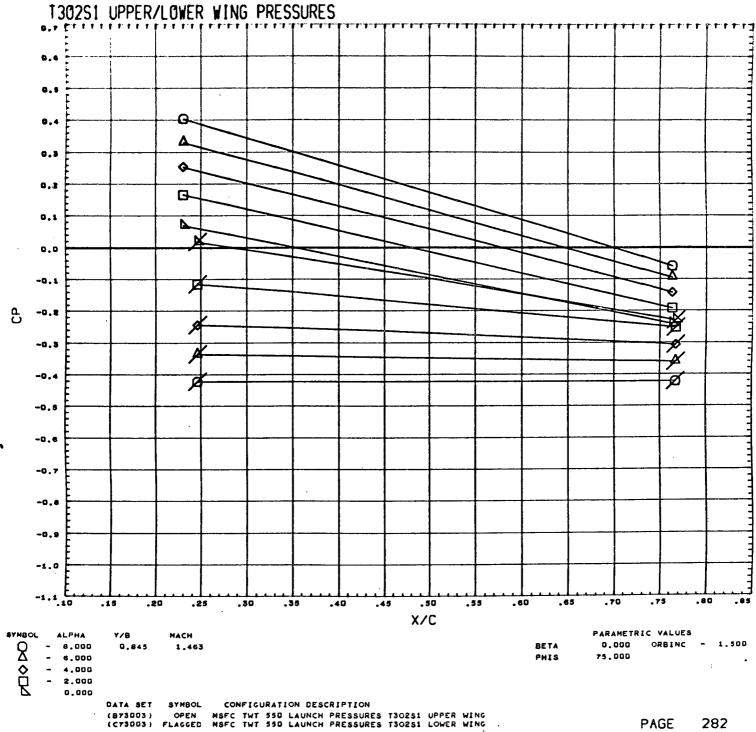


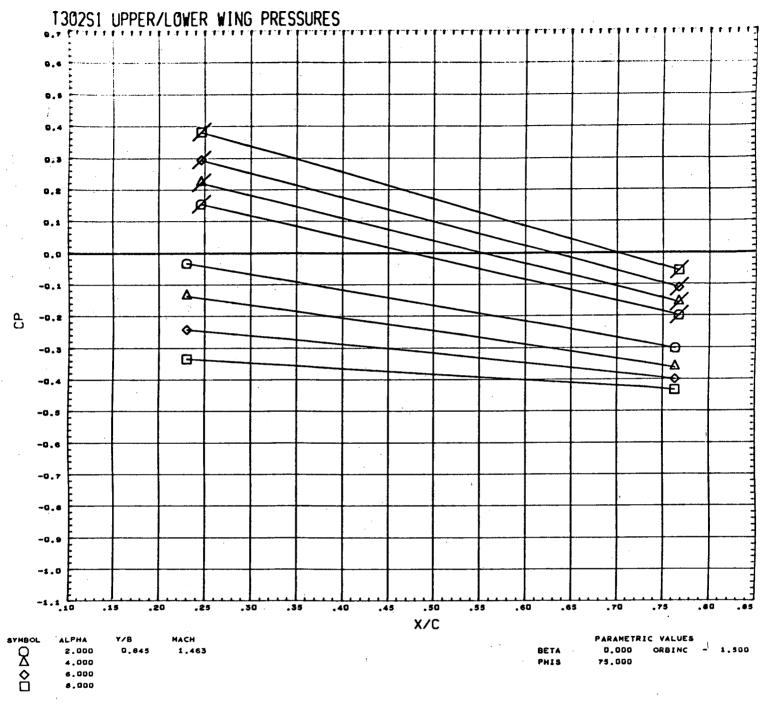


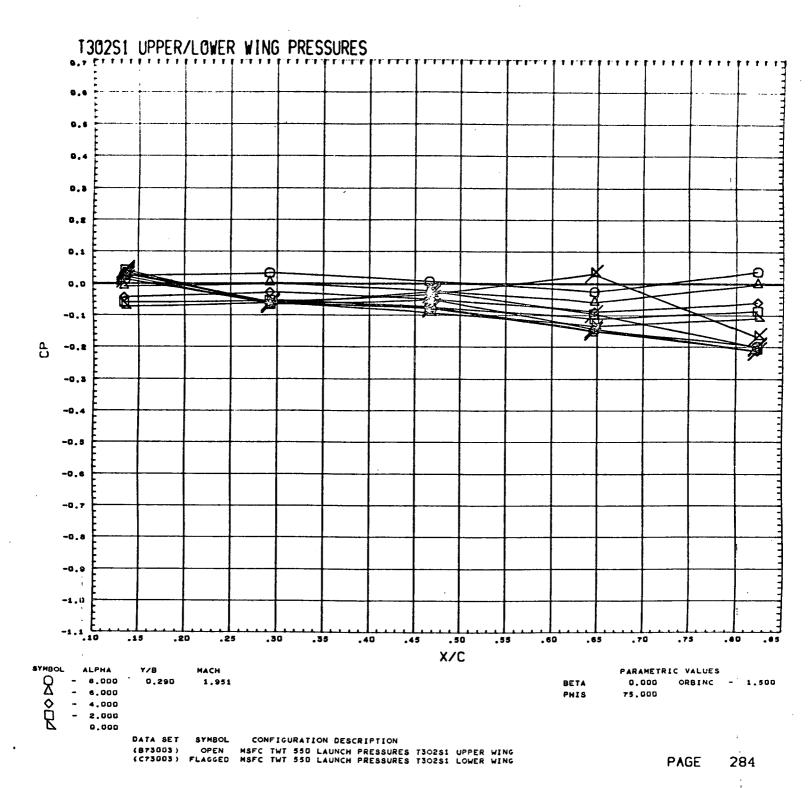


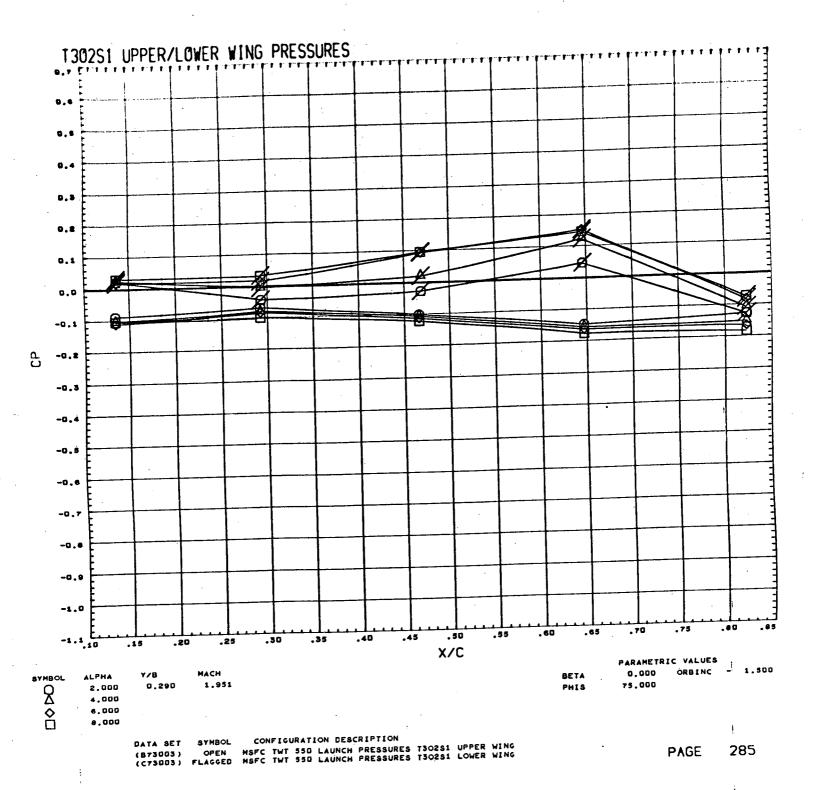


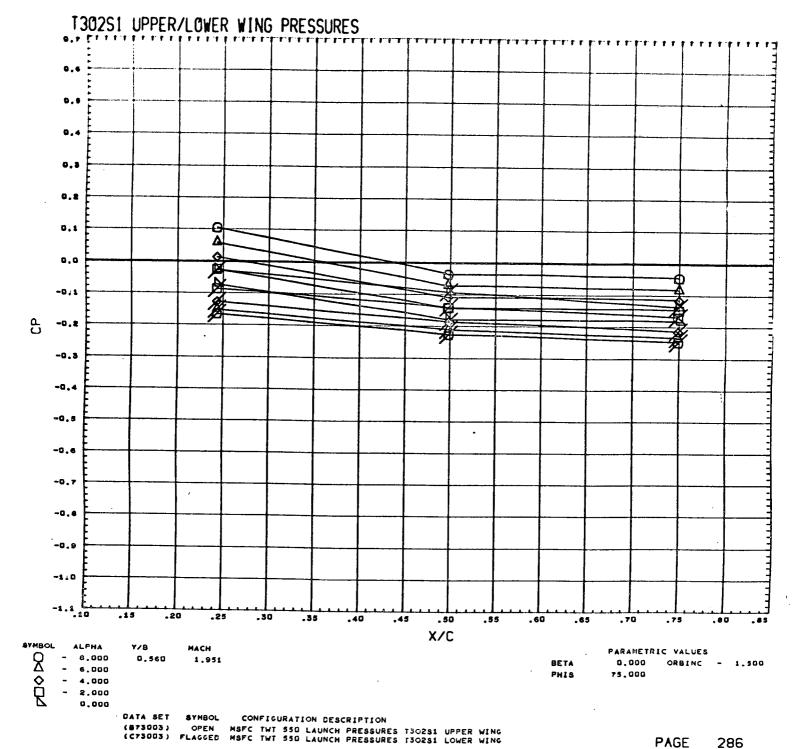


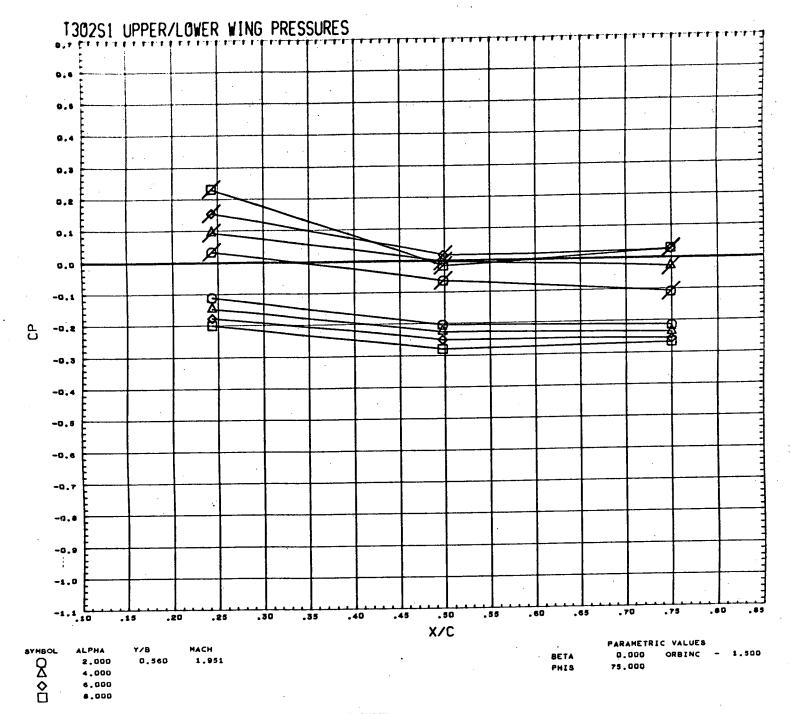


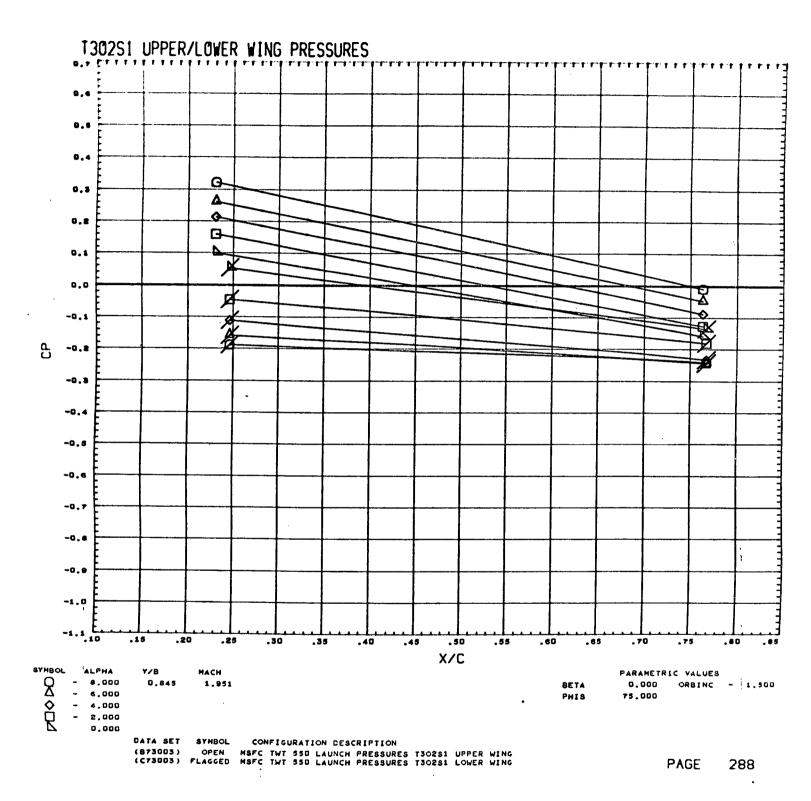


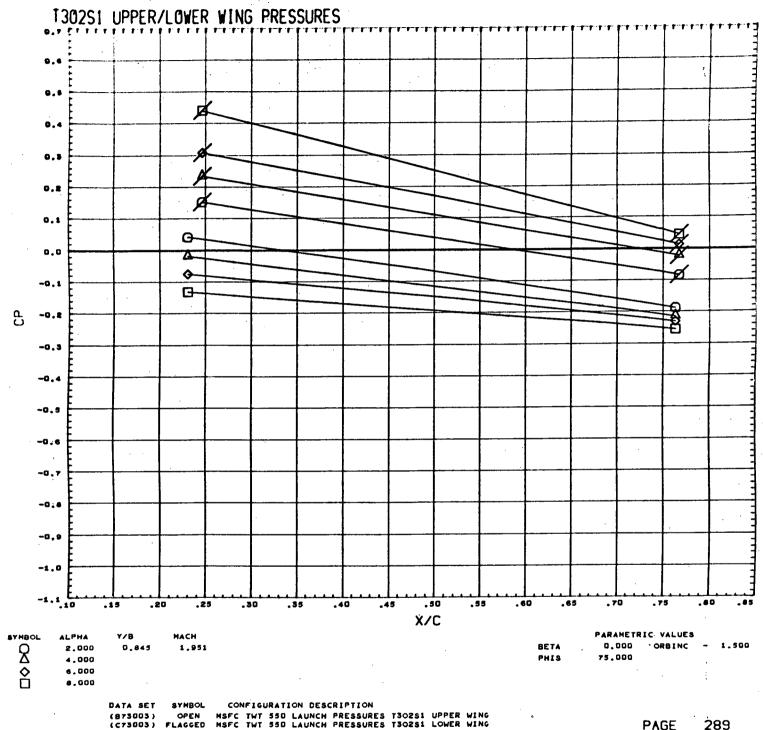


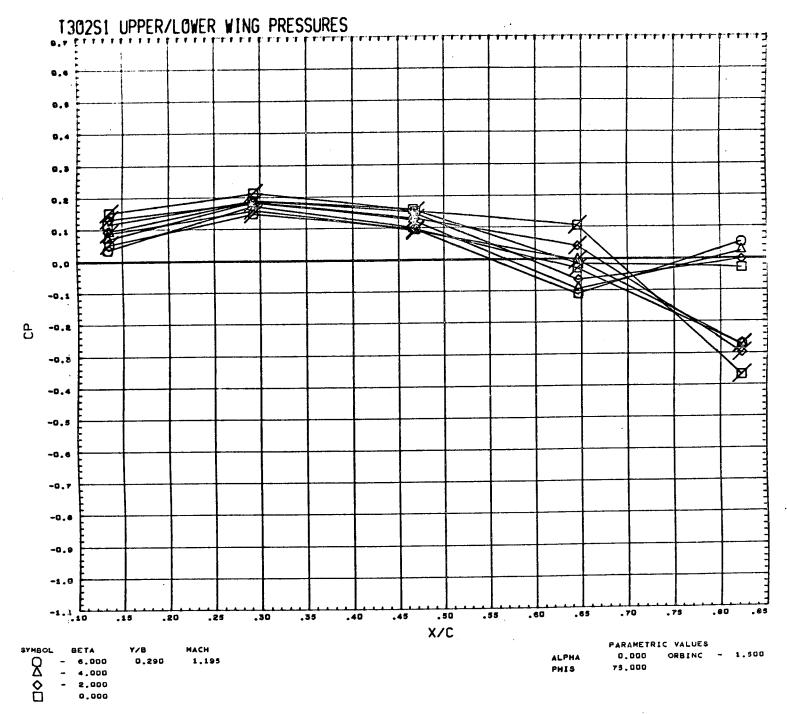


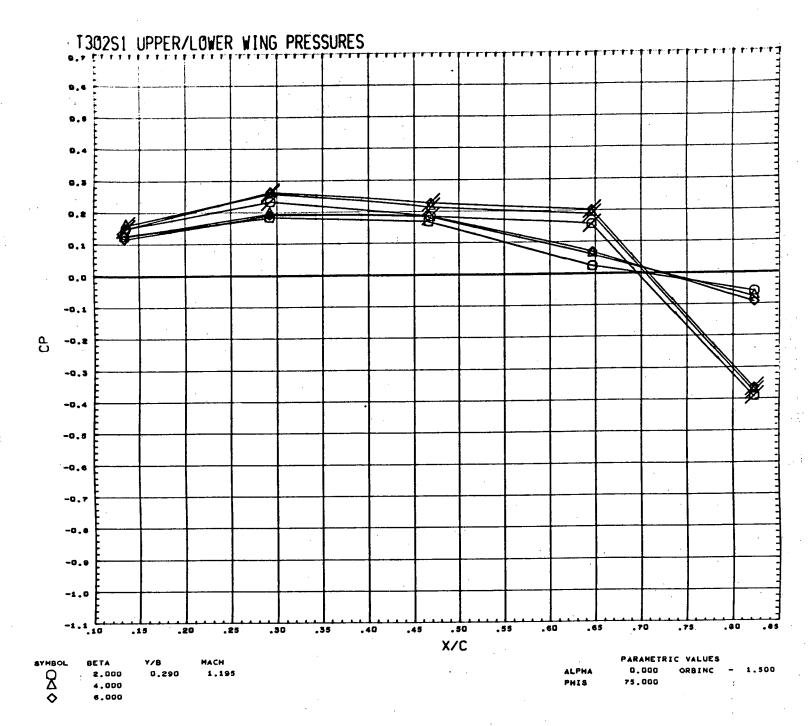


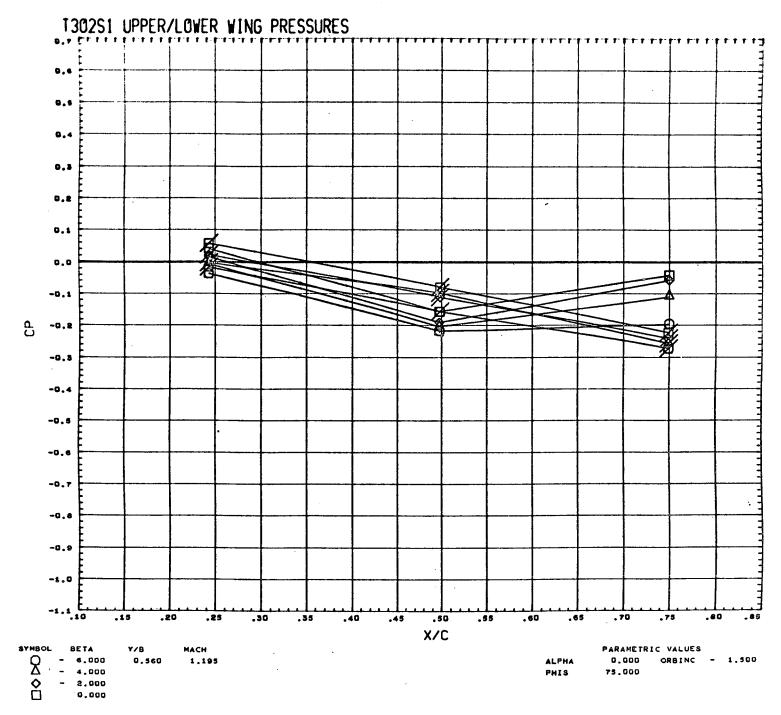


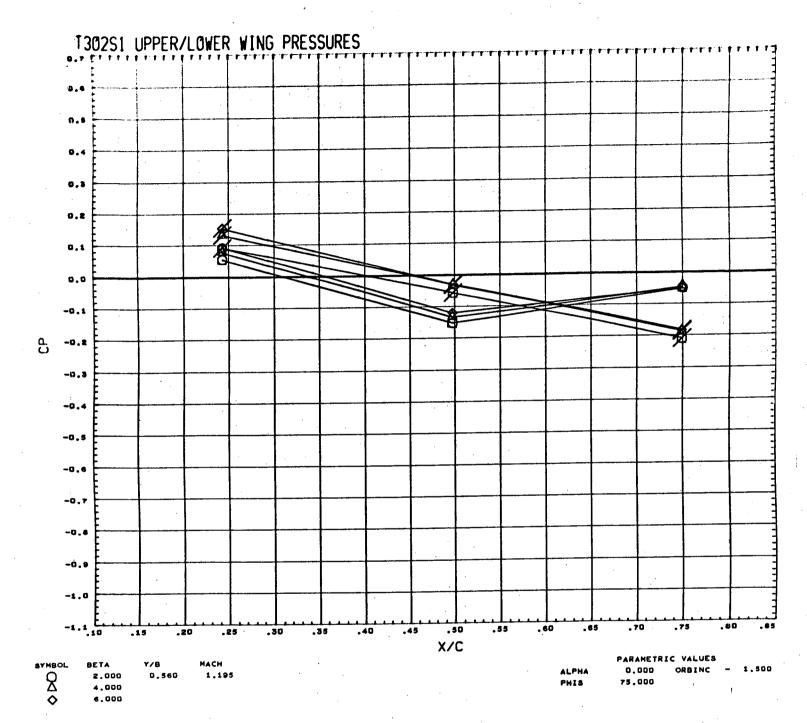


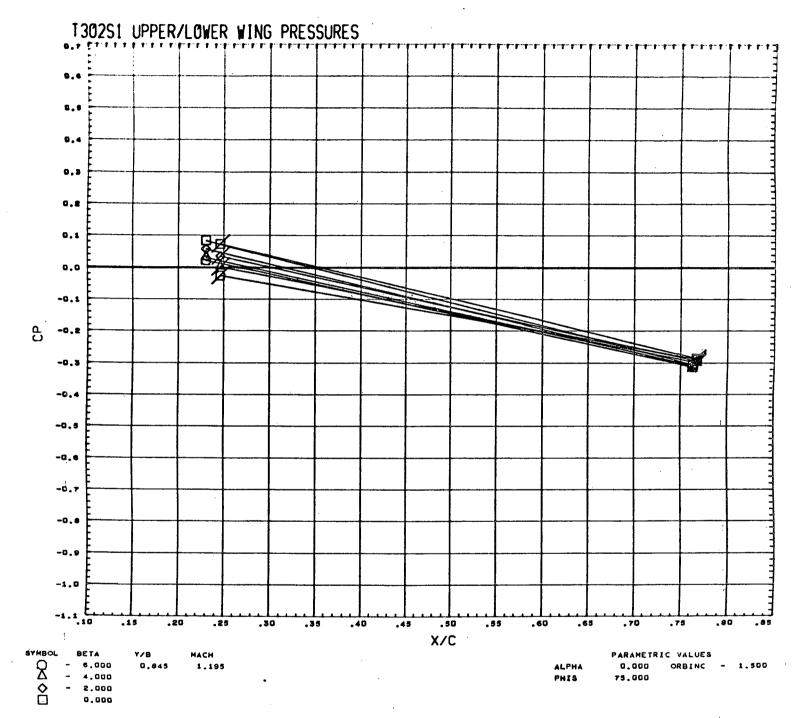


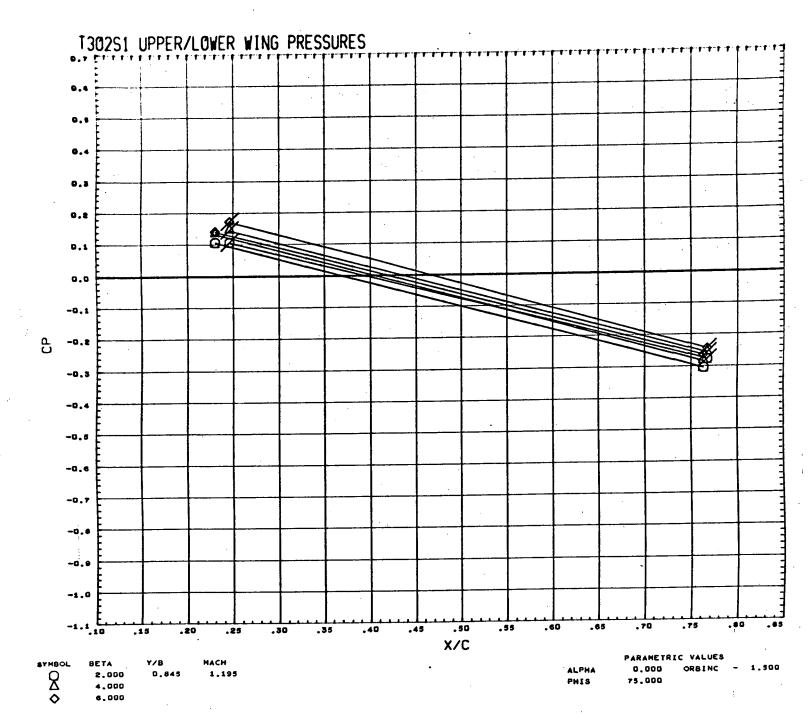


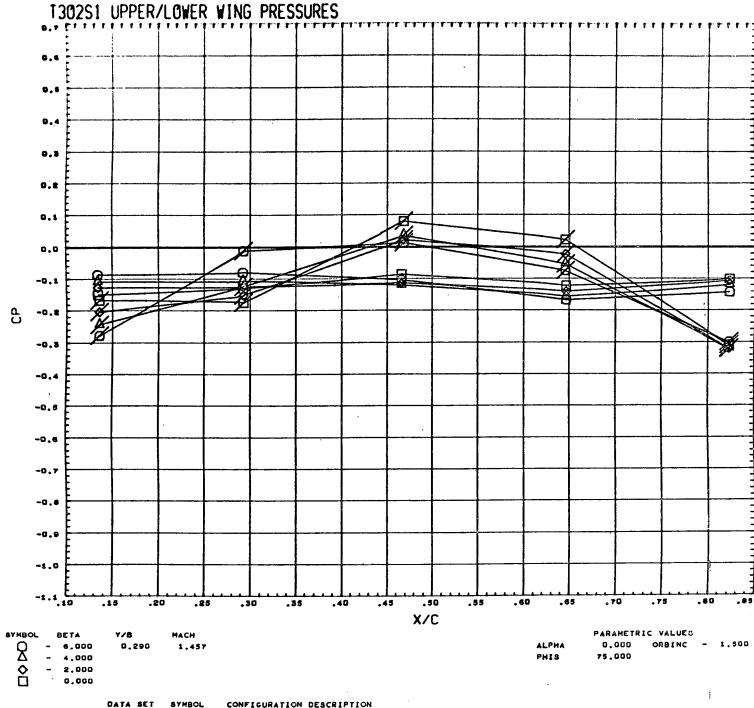


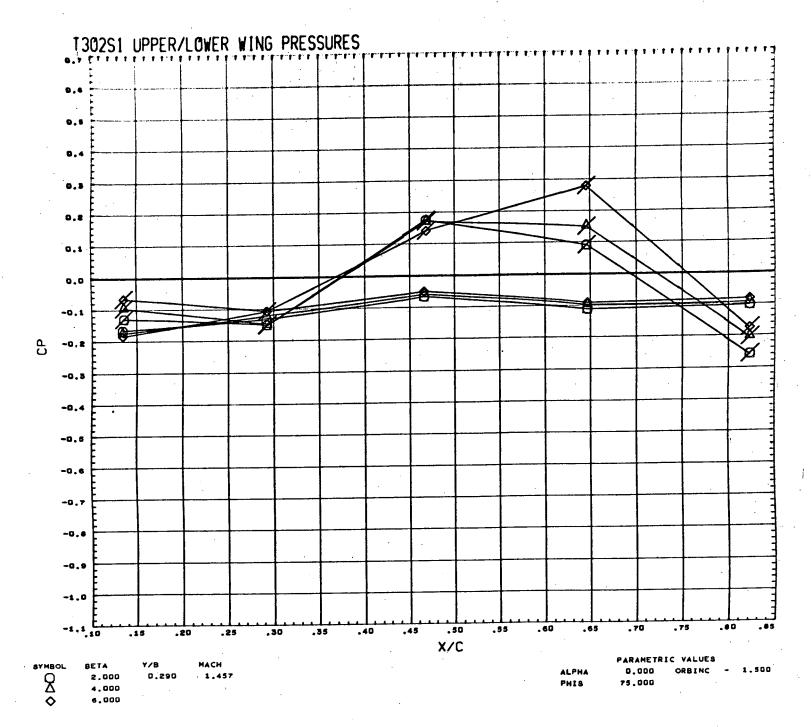


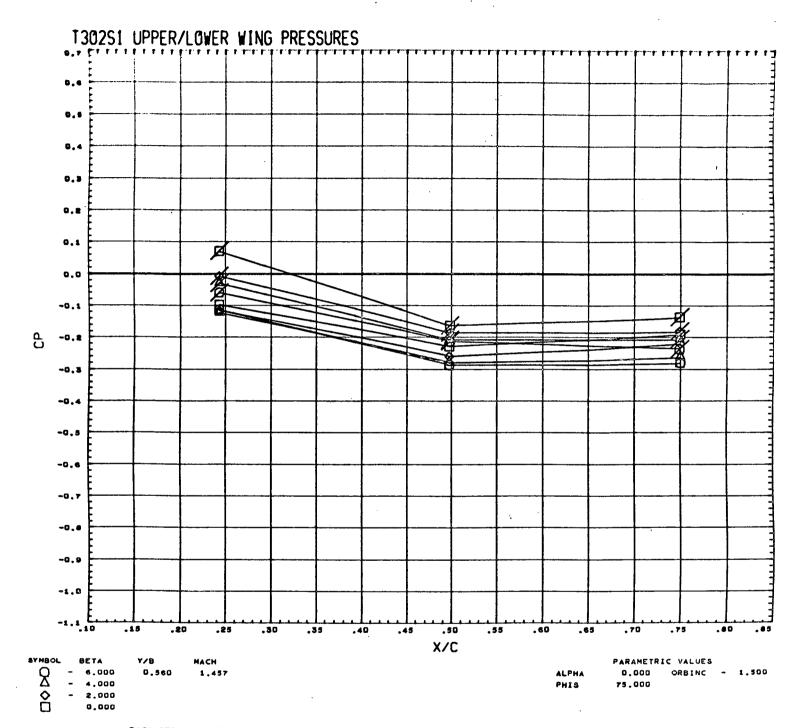


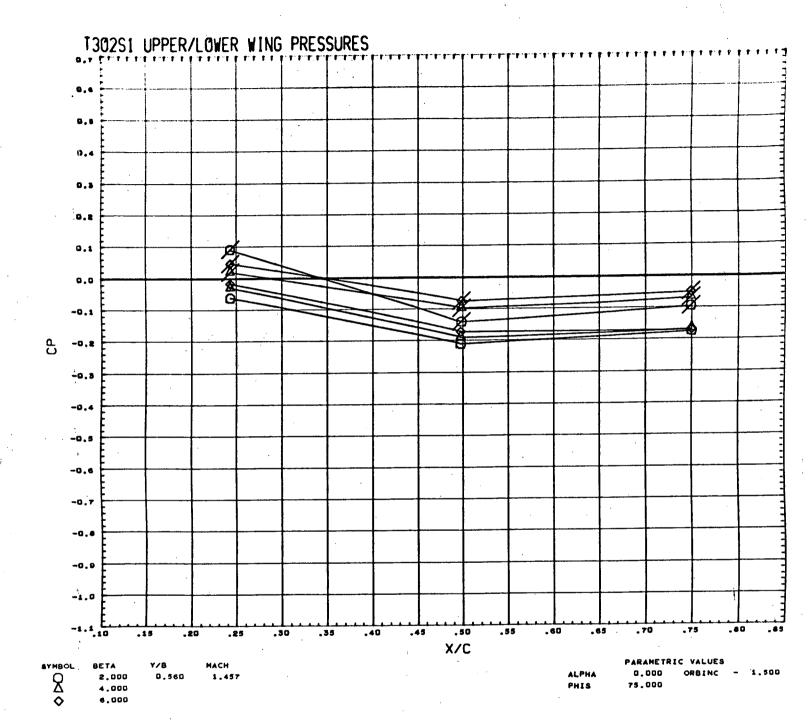


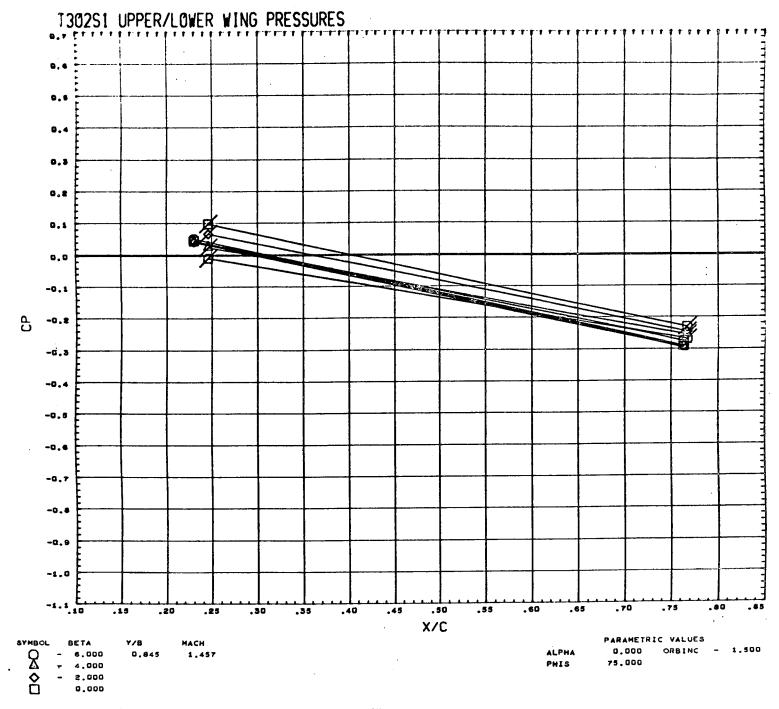


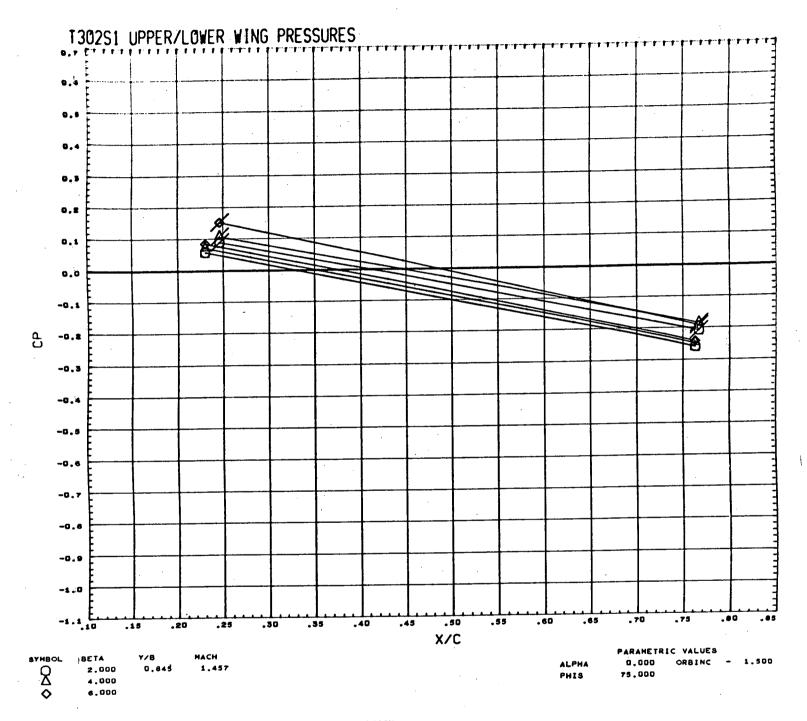






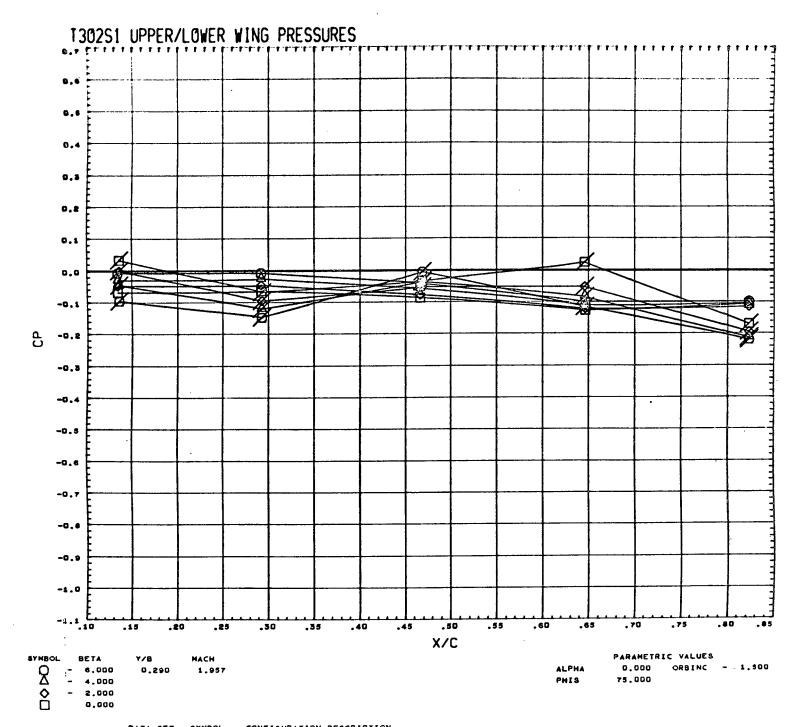


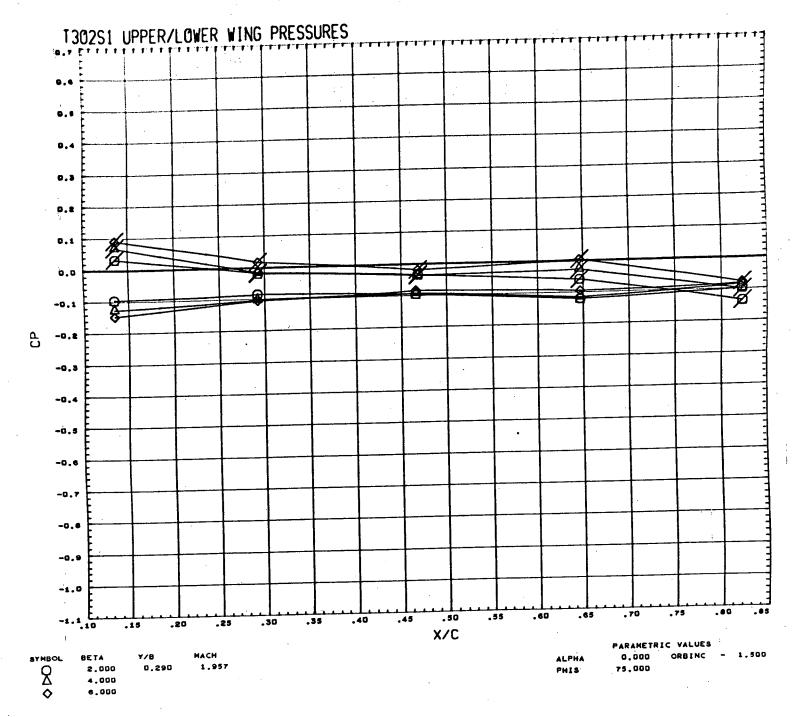


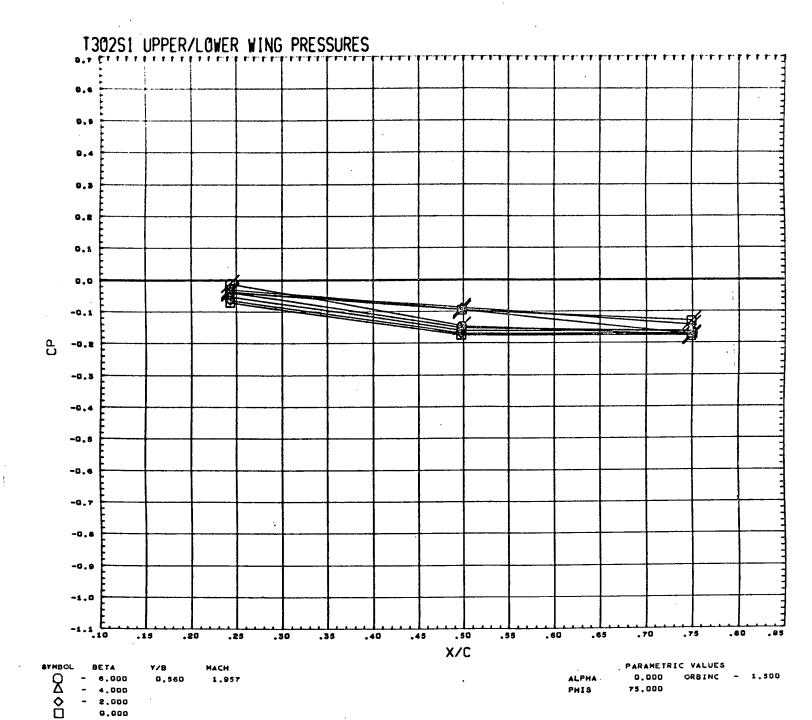


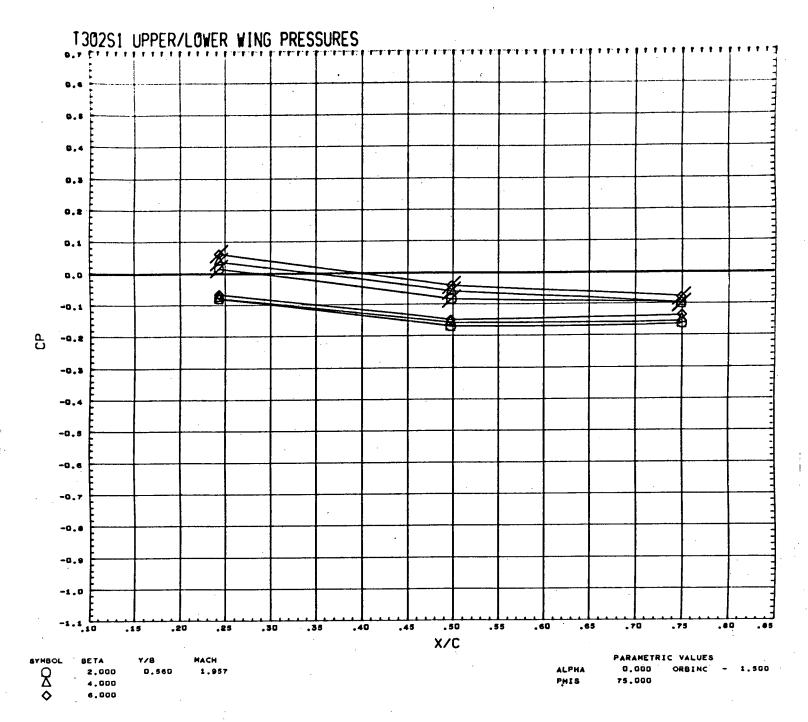
PAGE 301

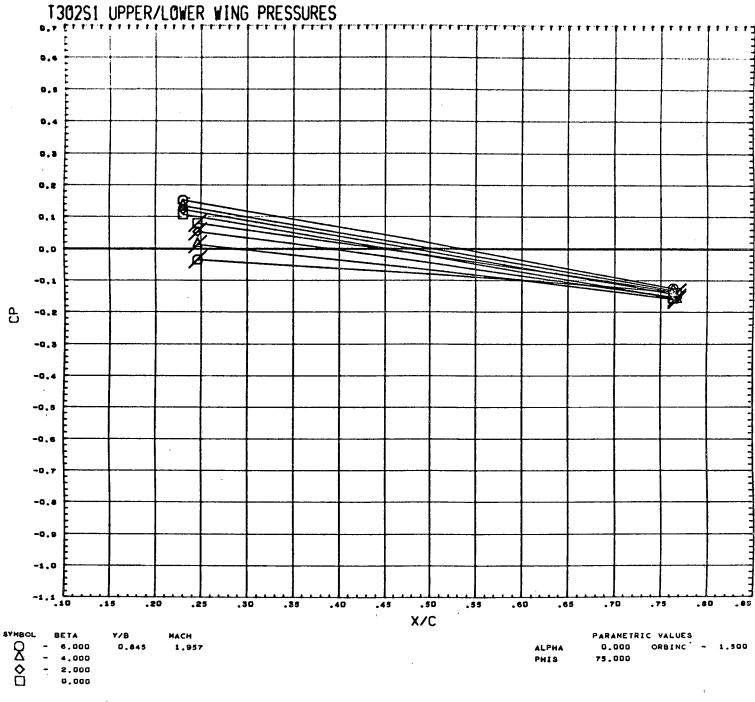
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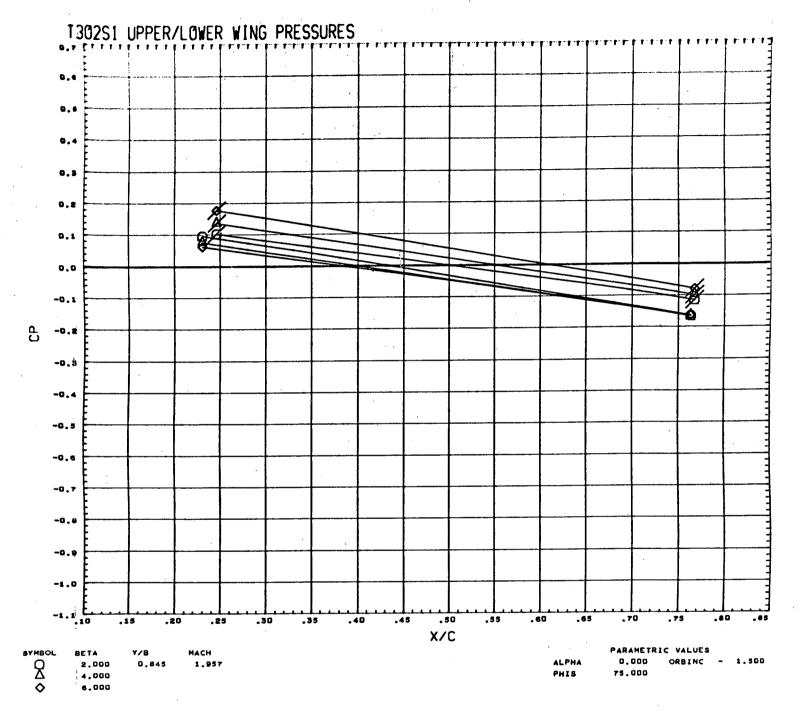


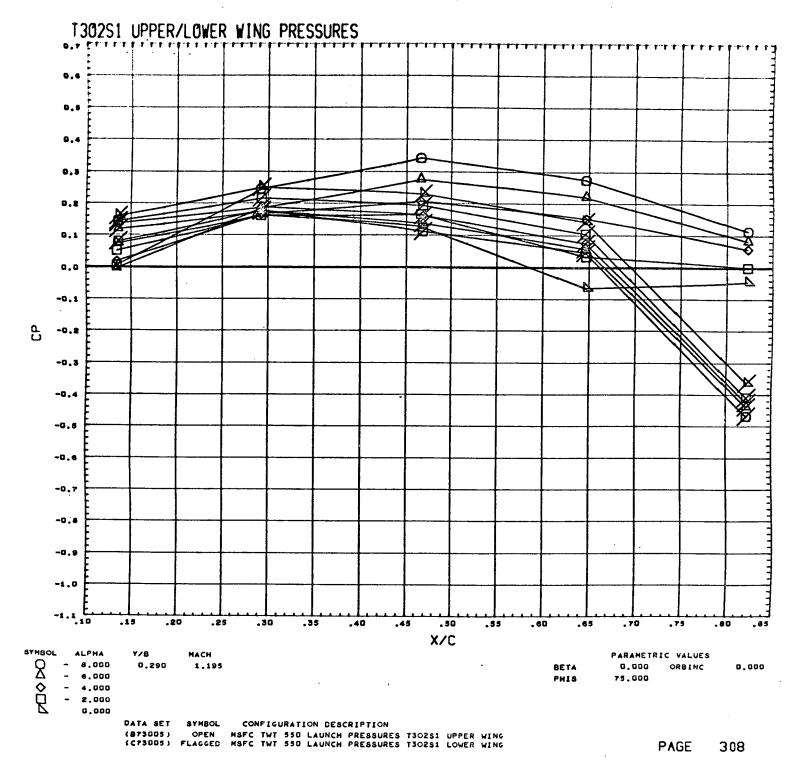


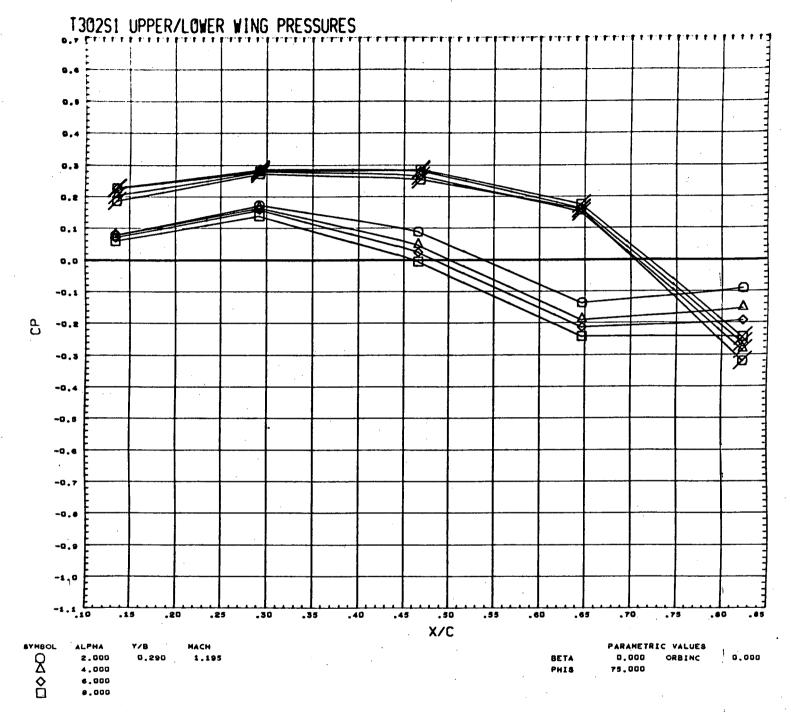


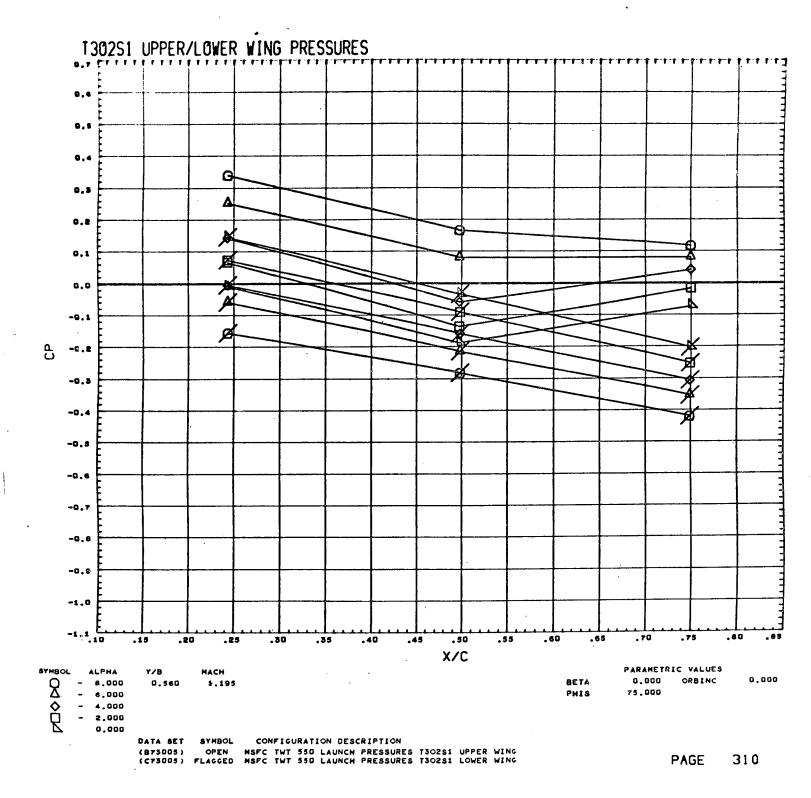


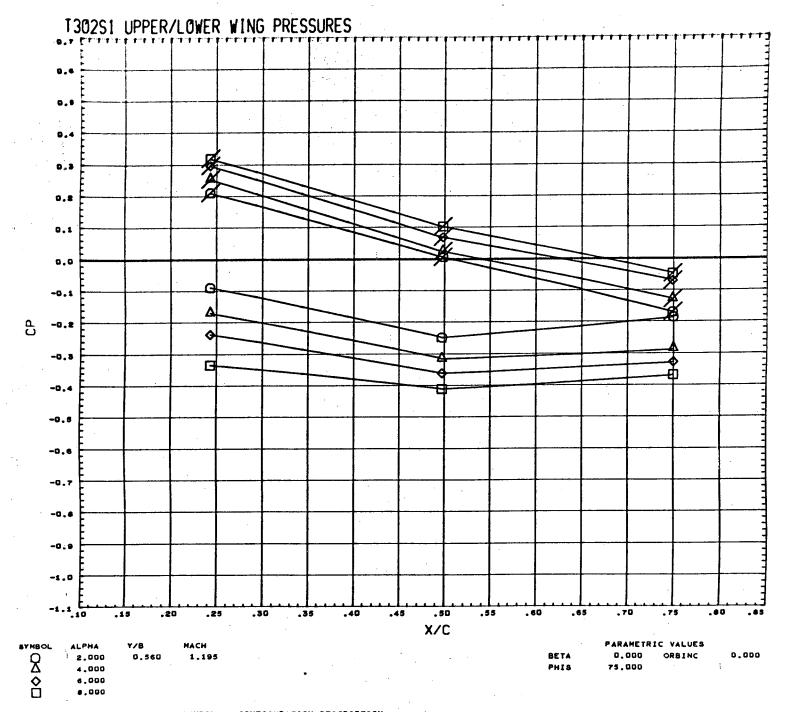




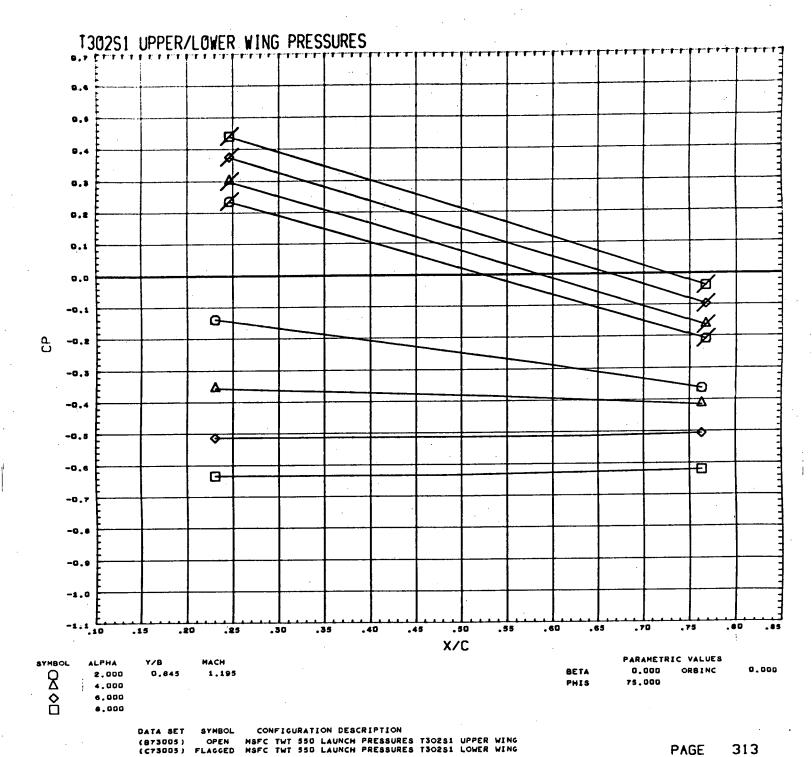






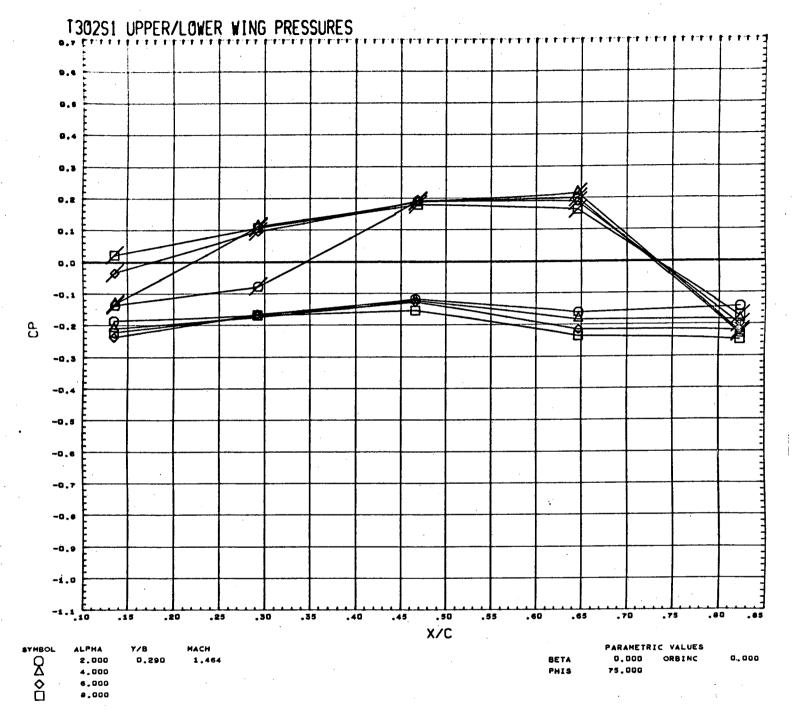


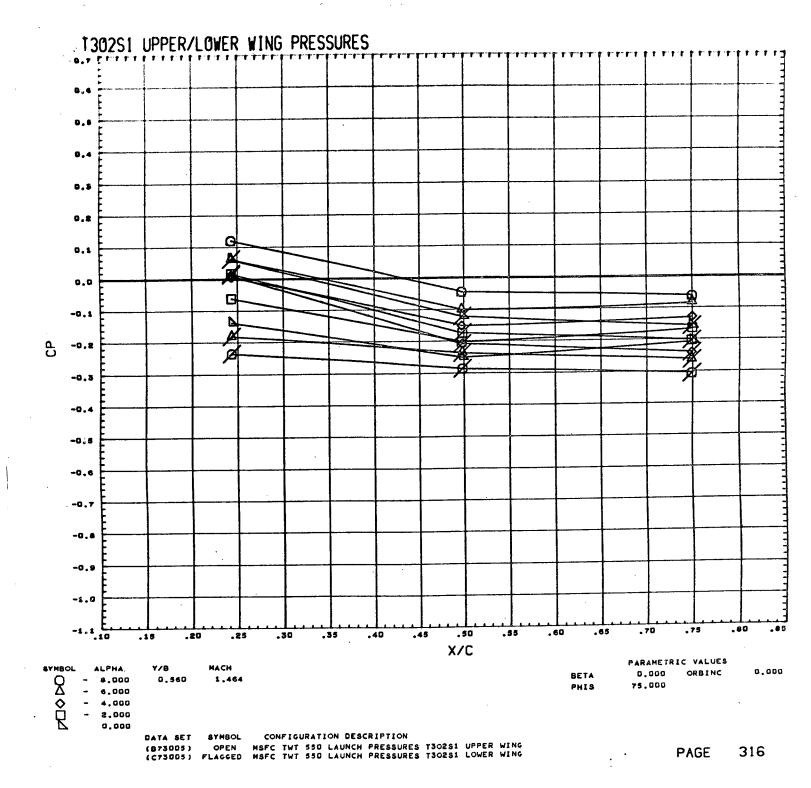


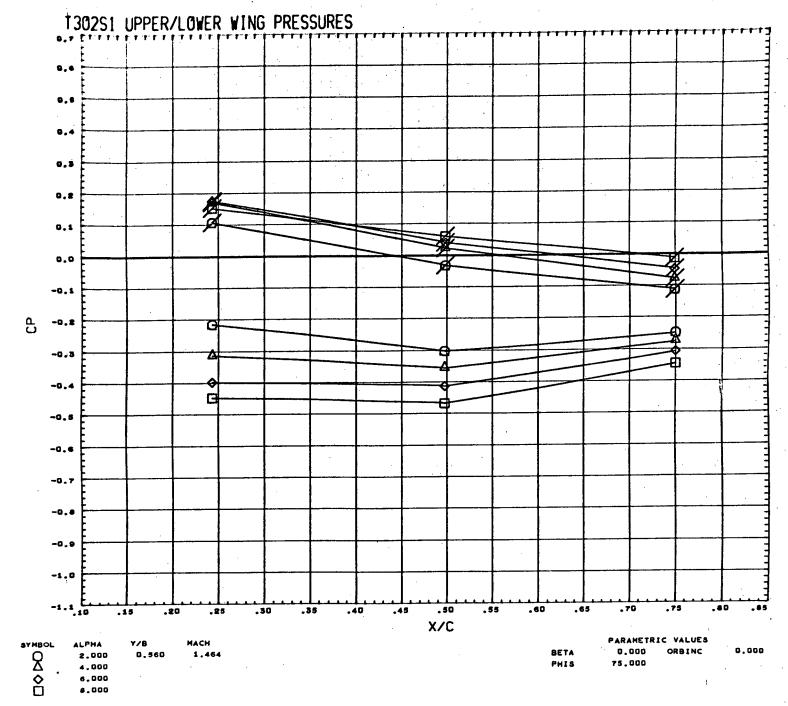


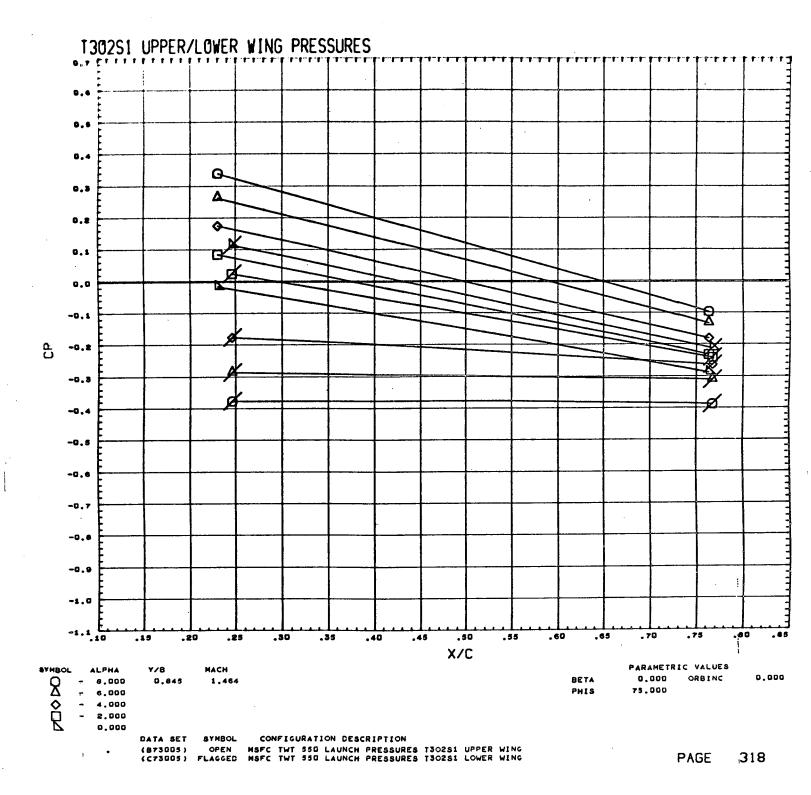
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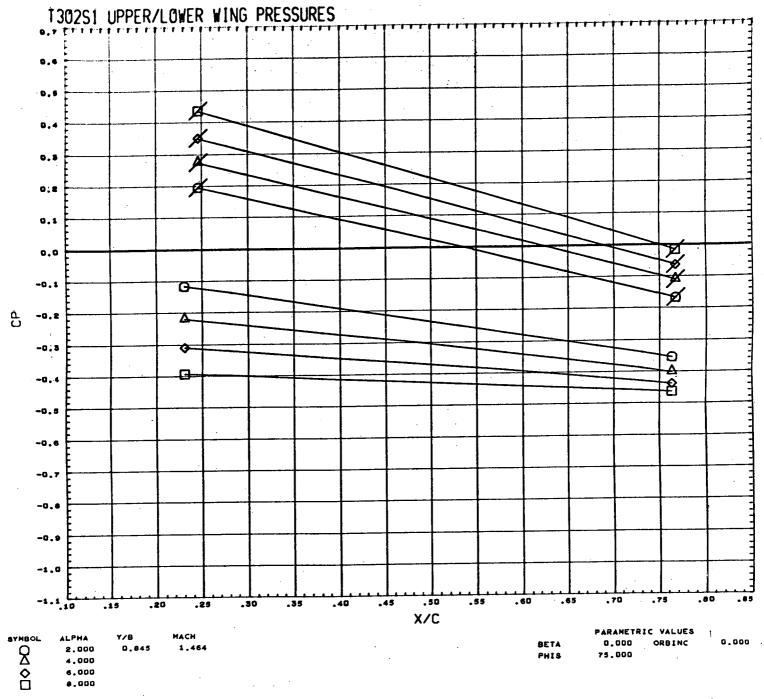
314

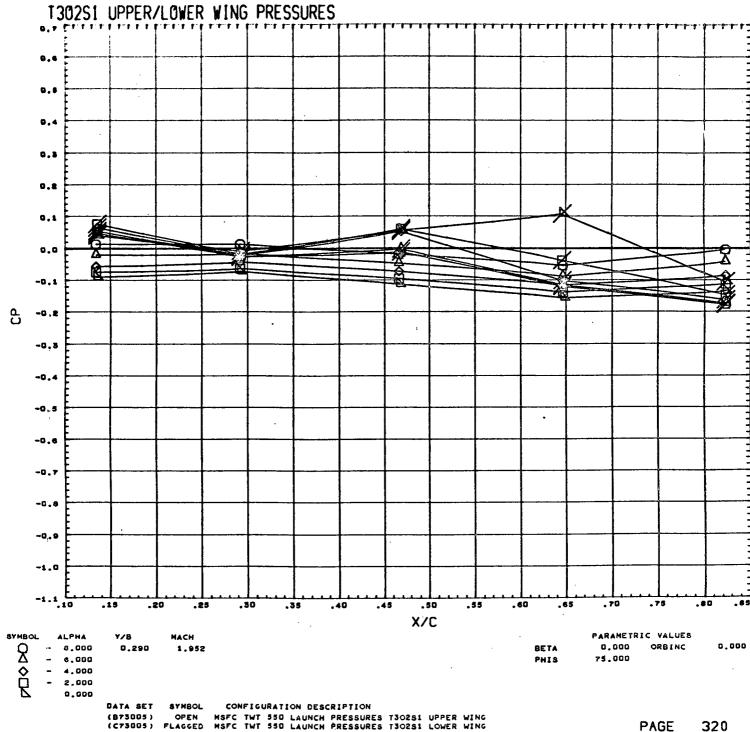


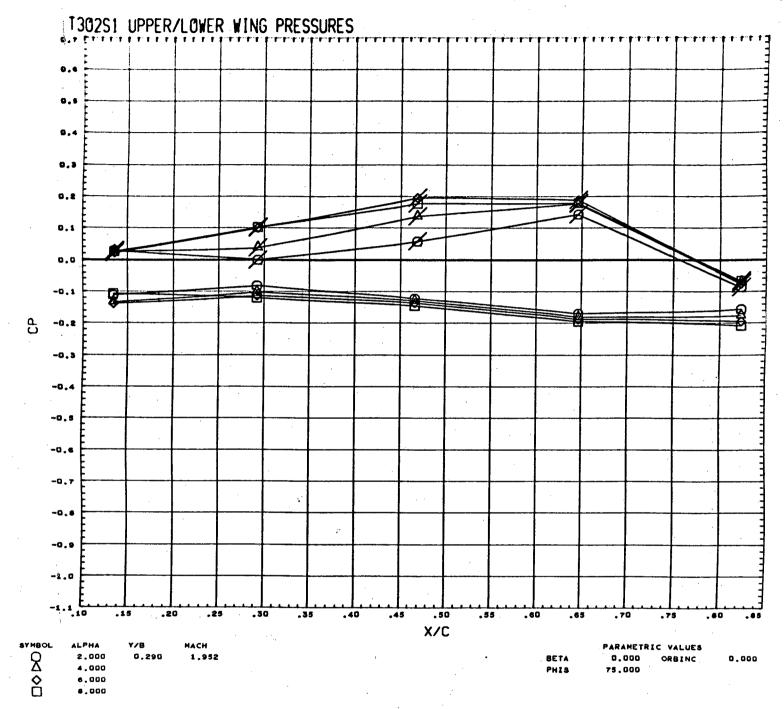


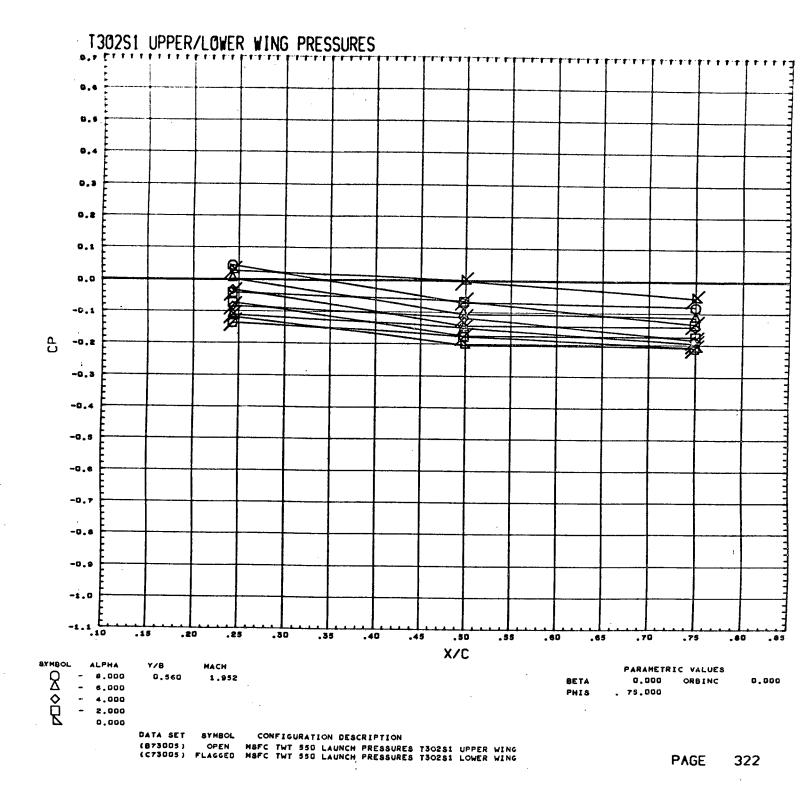


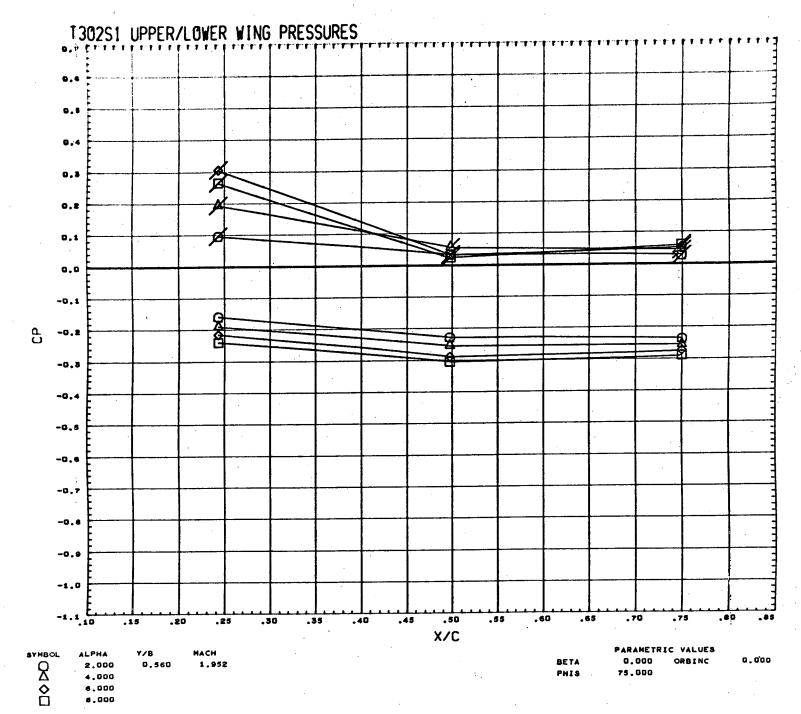


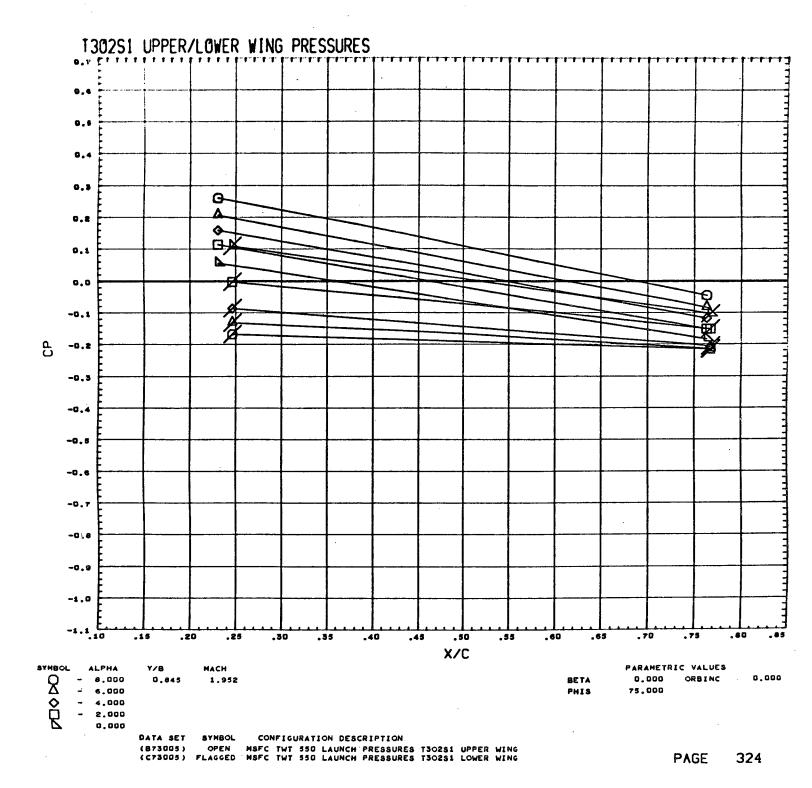


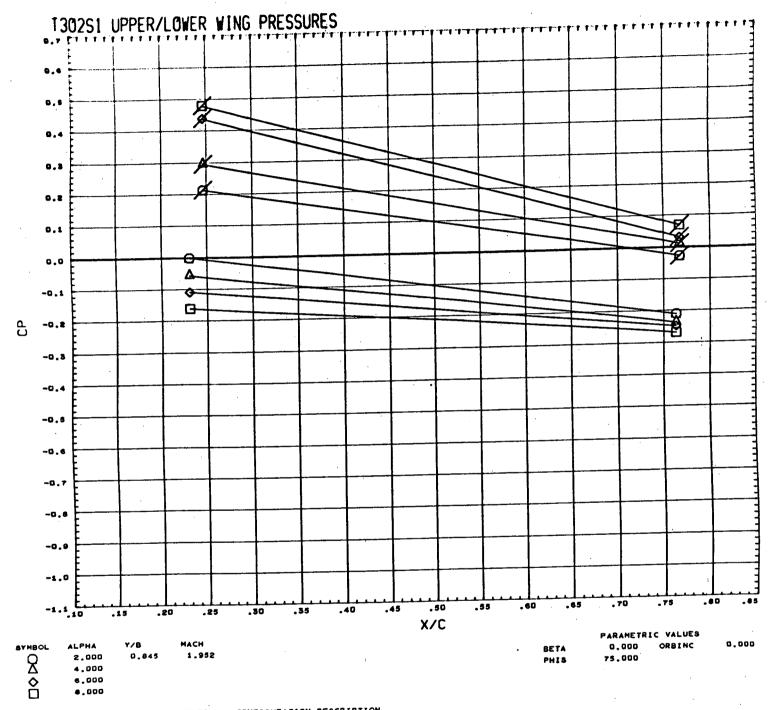






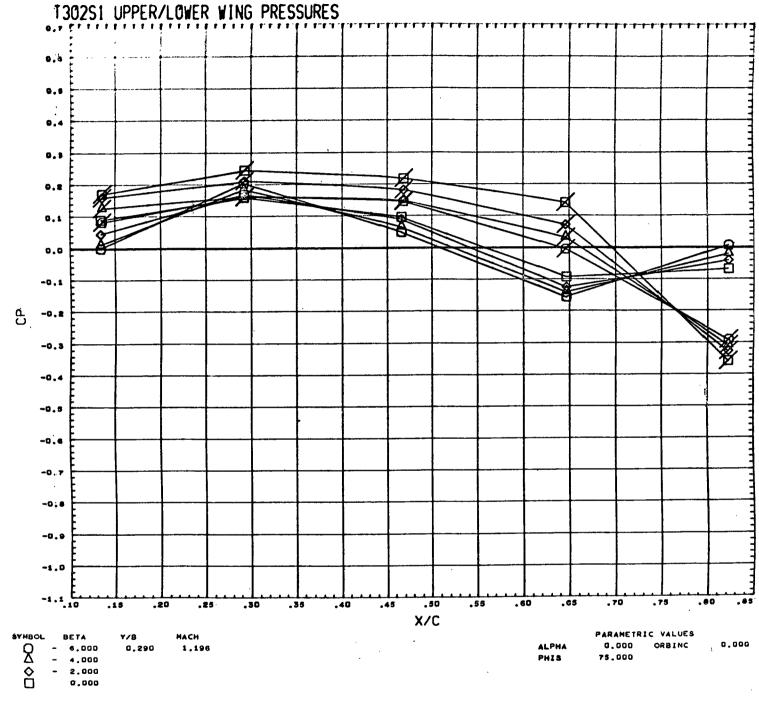


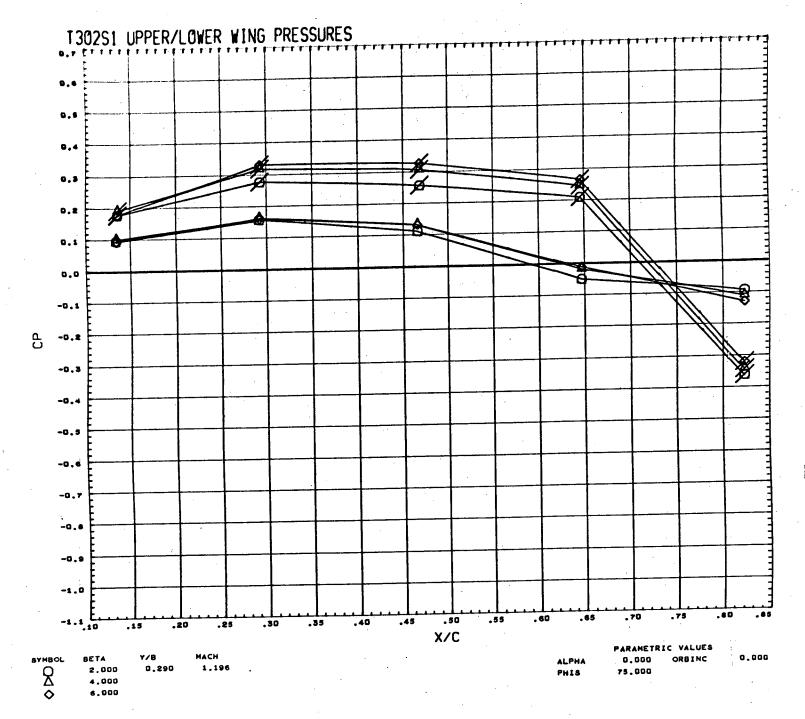


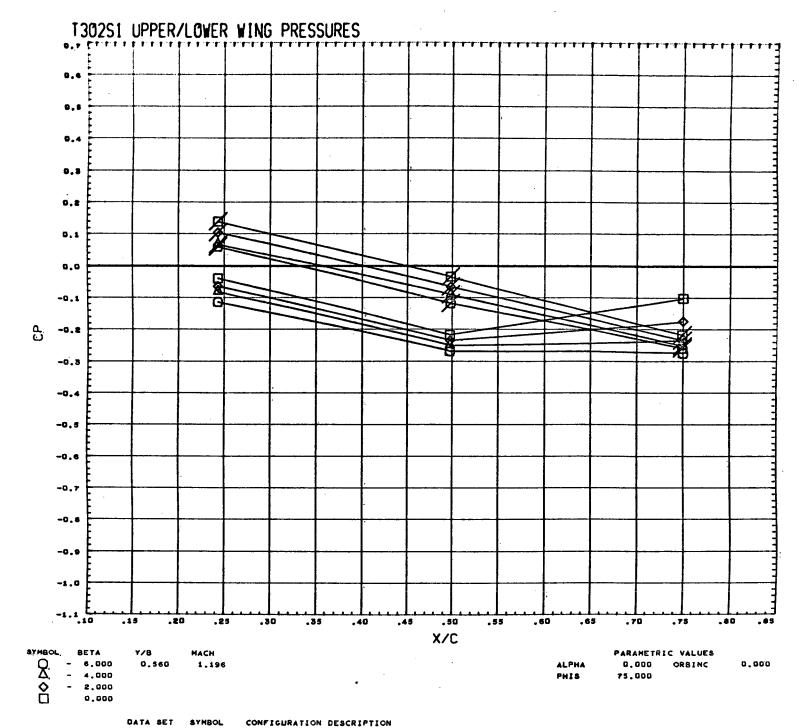


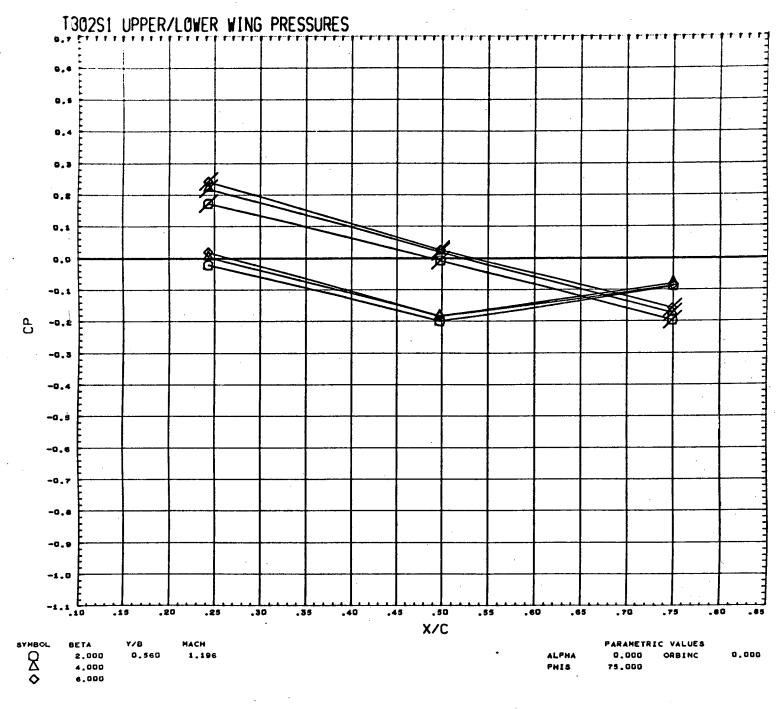
PAGE

325



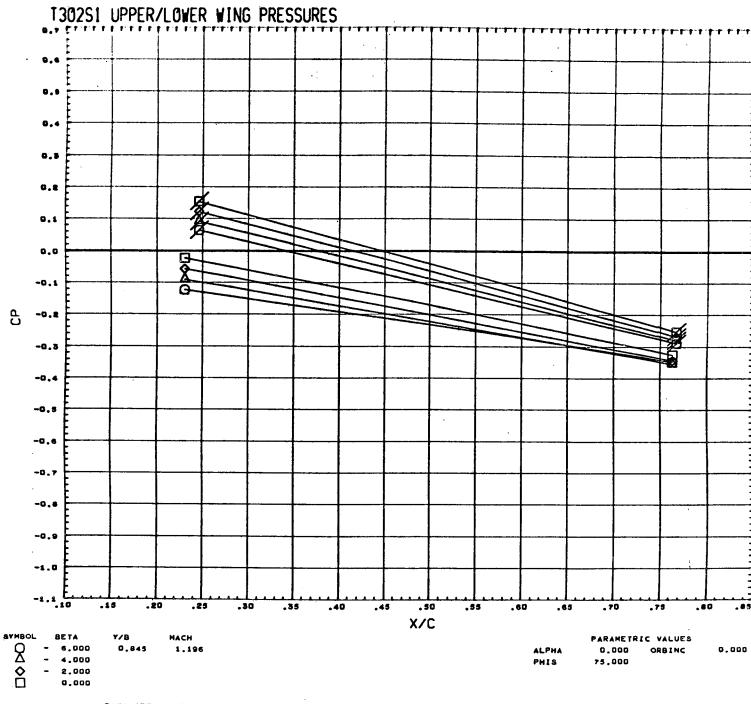






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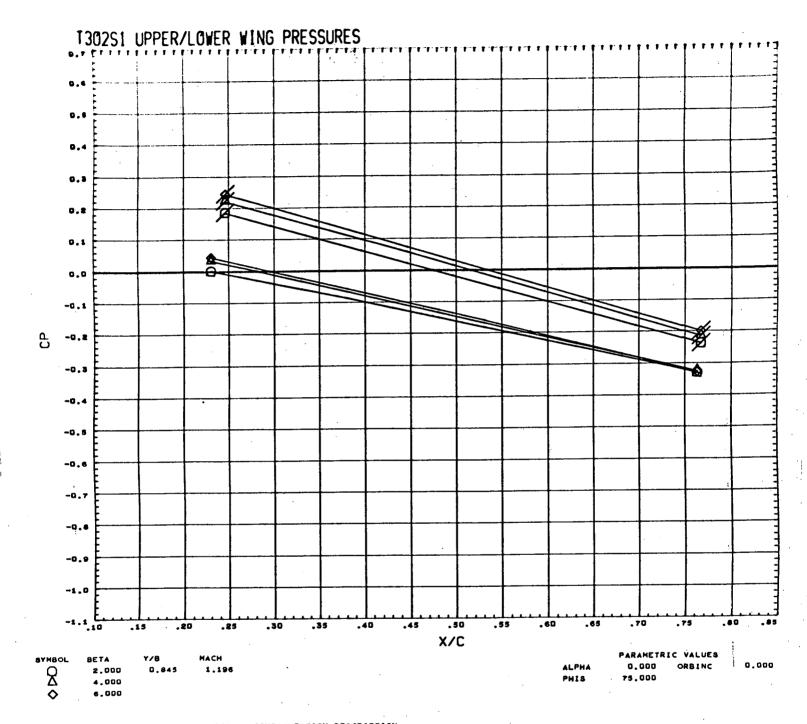
(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING (C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

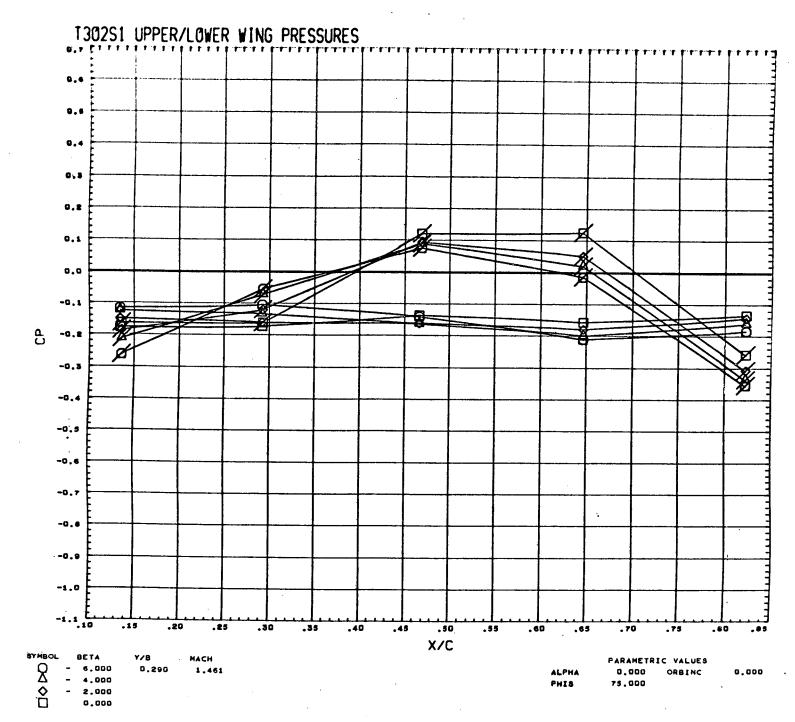
(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING

(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

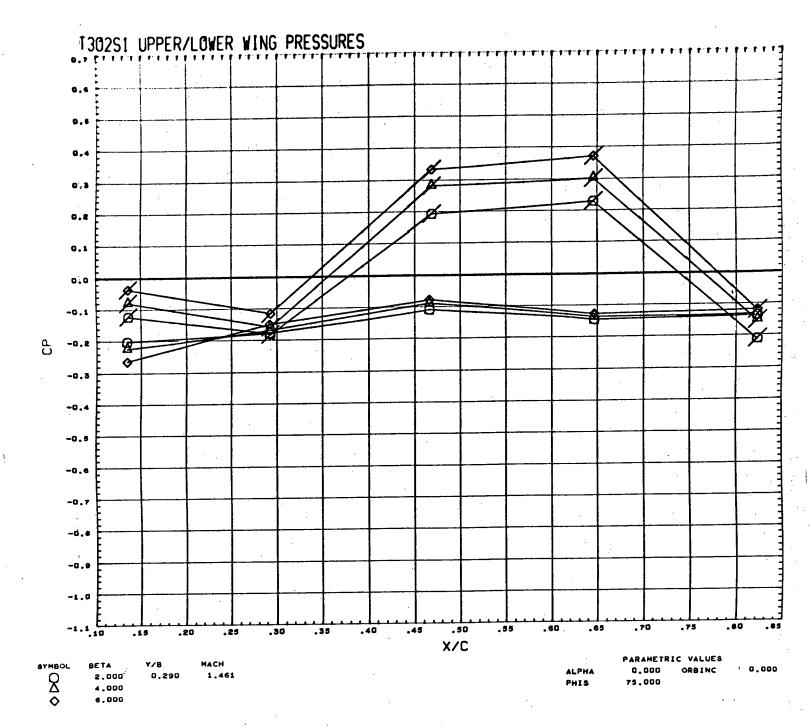
(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING
(C73006) PLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING

(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING

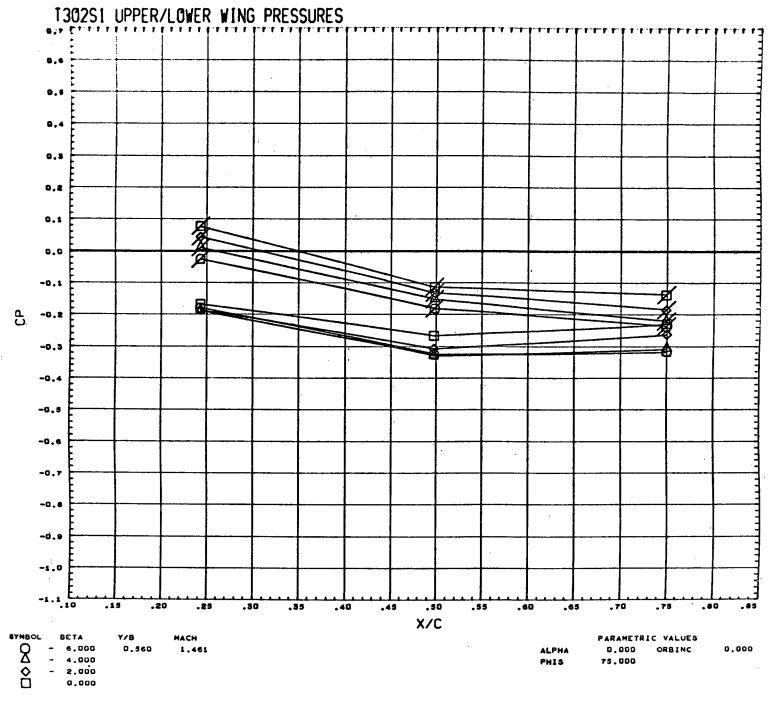


DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

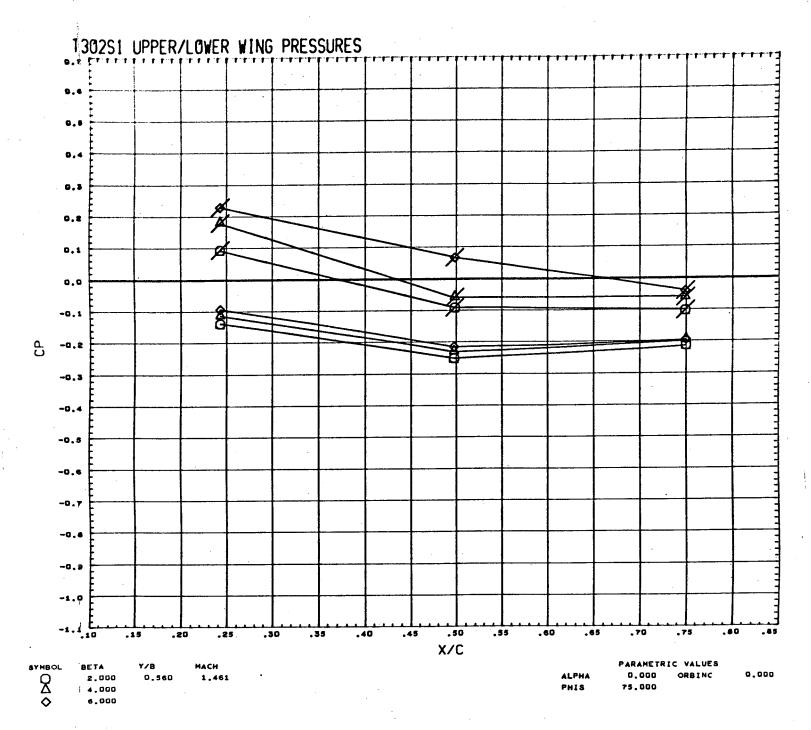
· PAGE 333



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

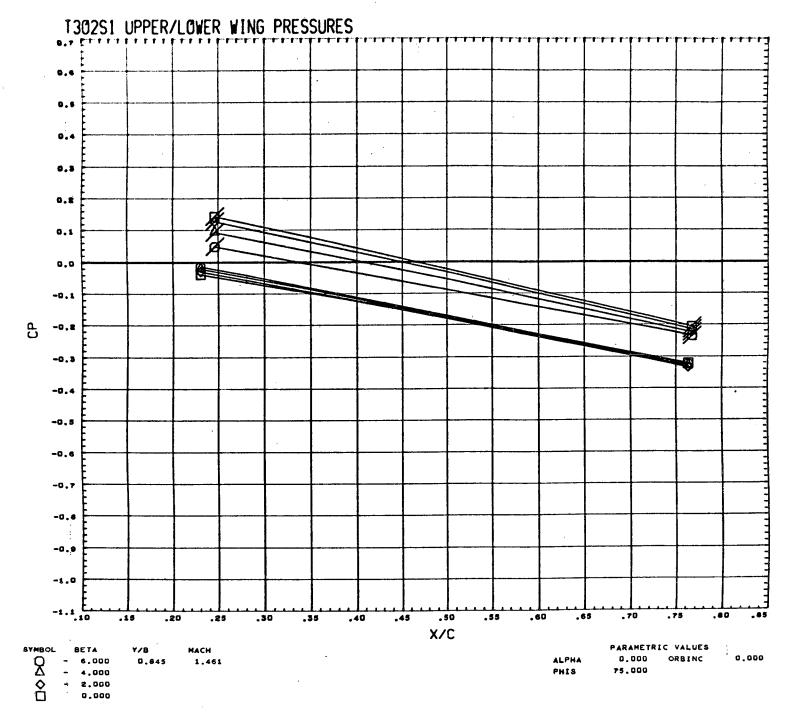
(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



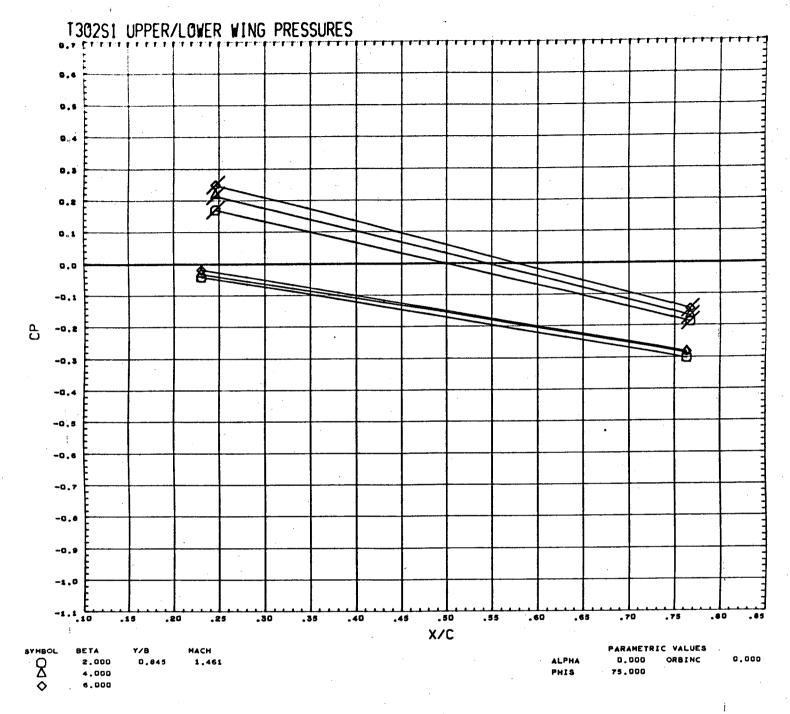
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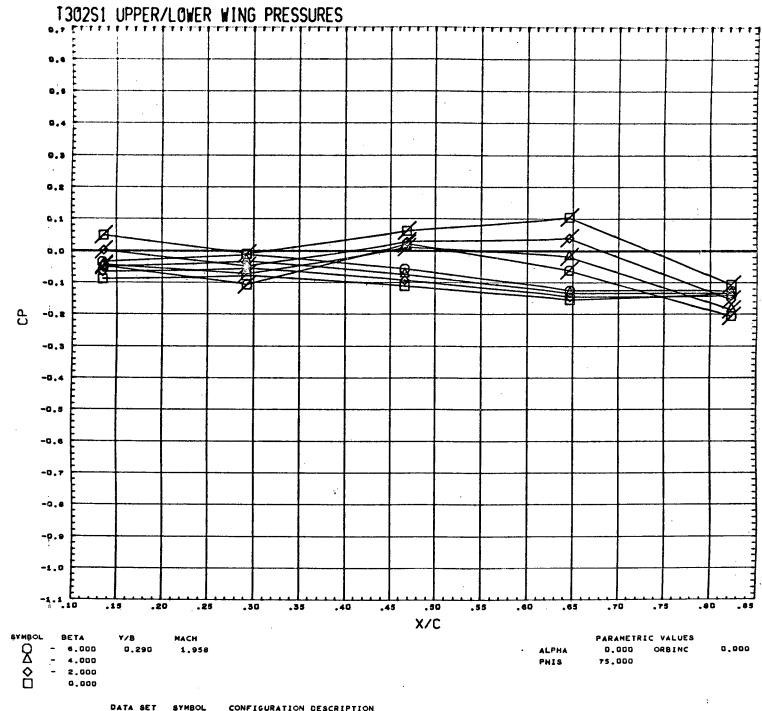
(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73006) FLAGGED MSFC TWT 55.0 LAUNCH PRESSURES T302S1 LOWER WING

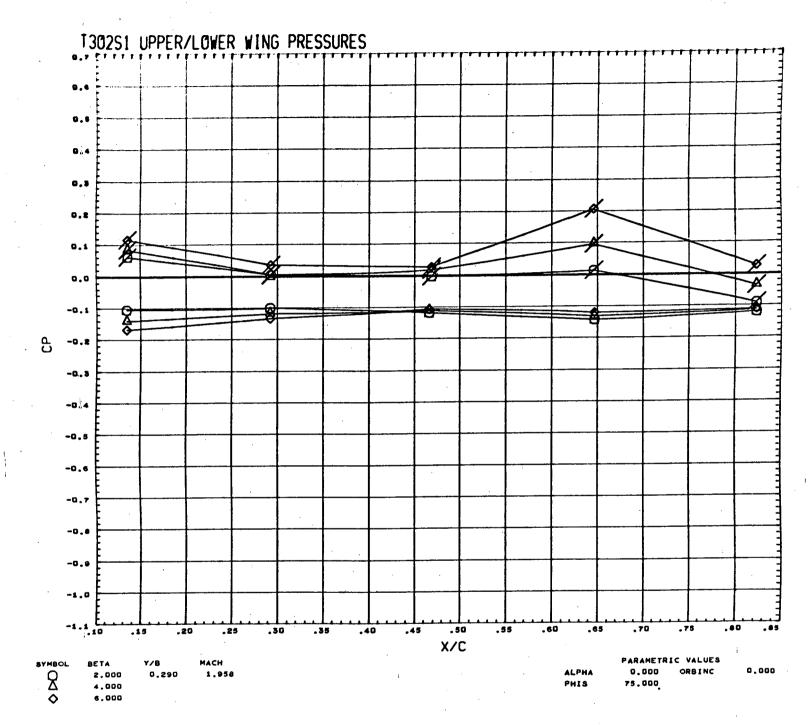


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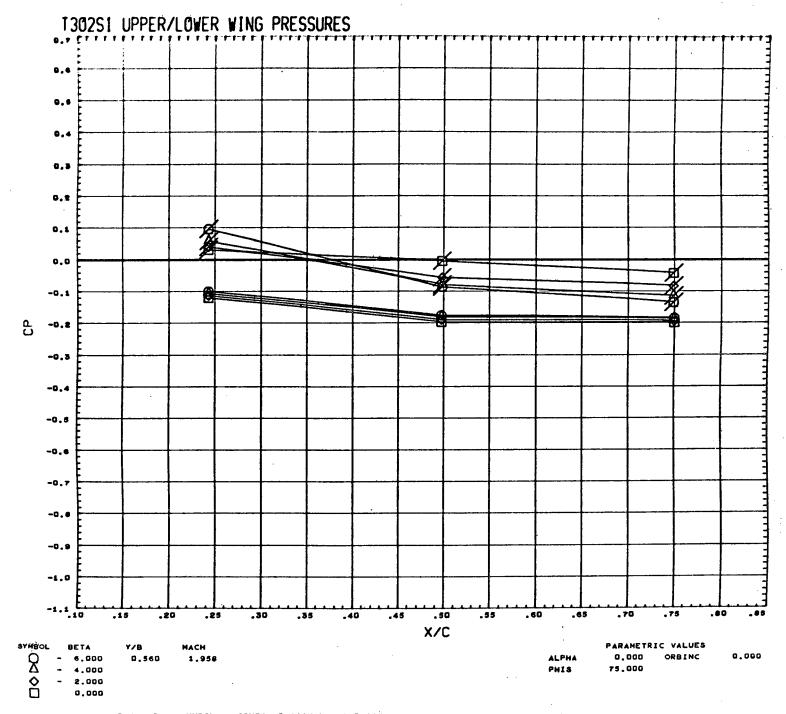
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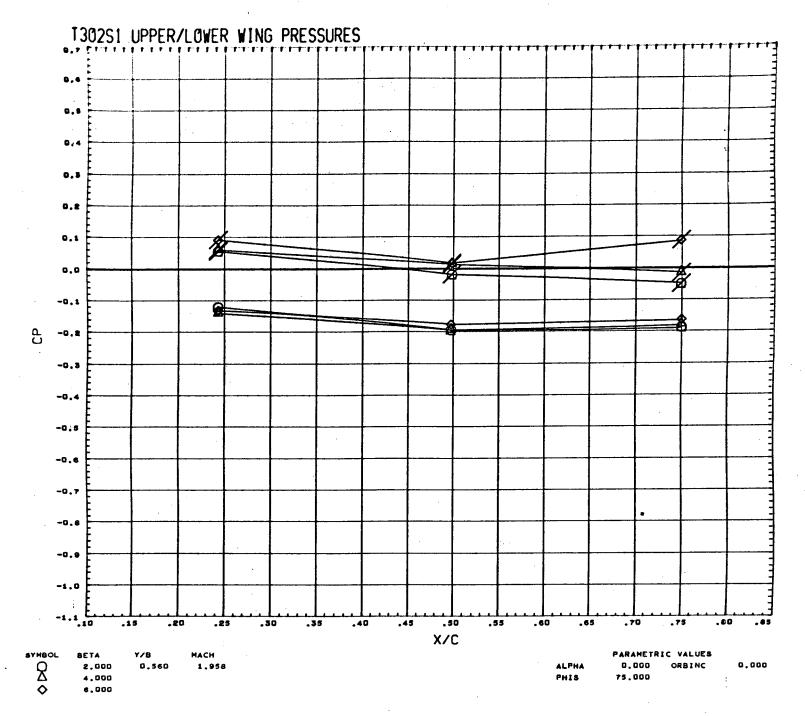
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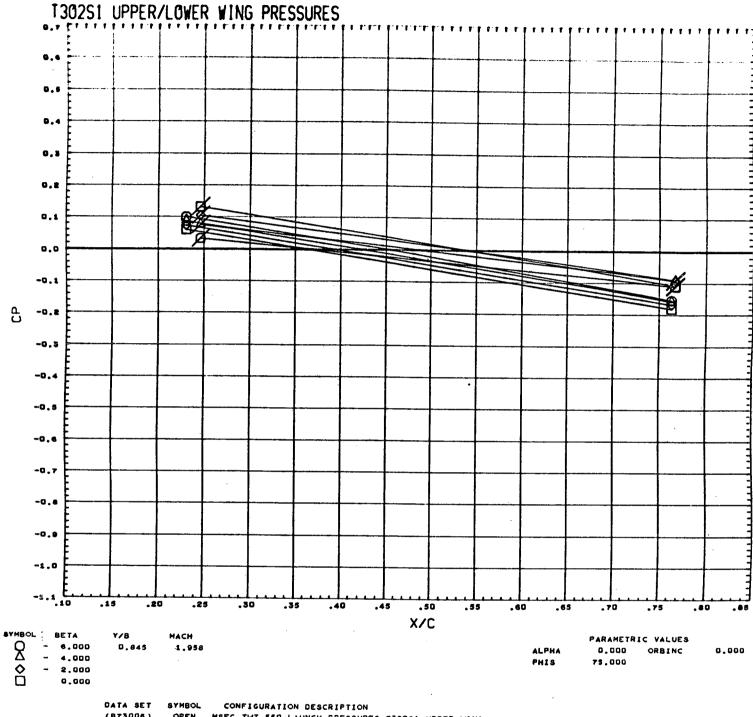


DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873006) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING
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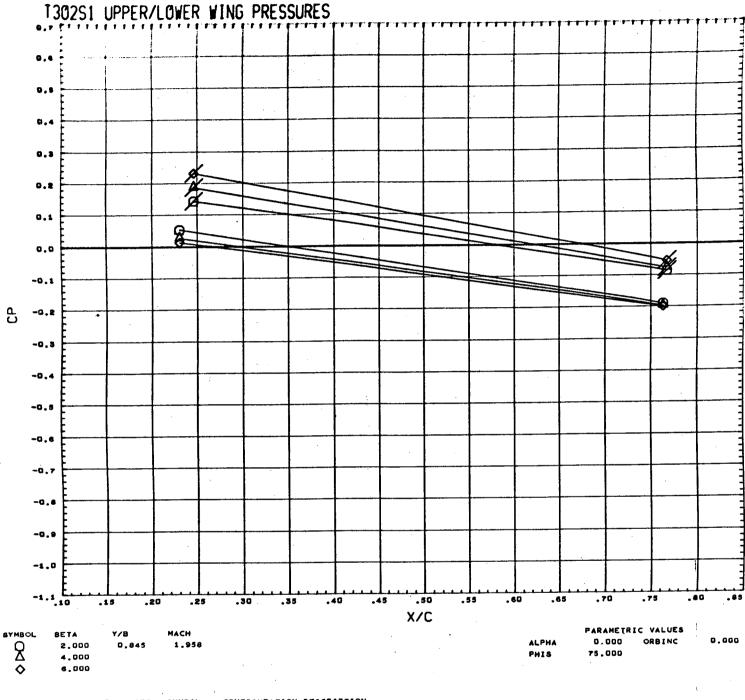
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(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

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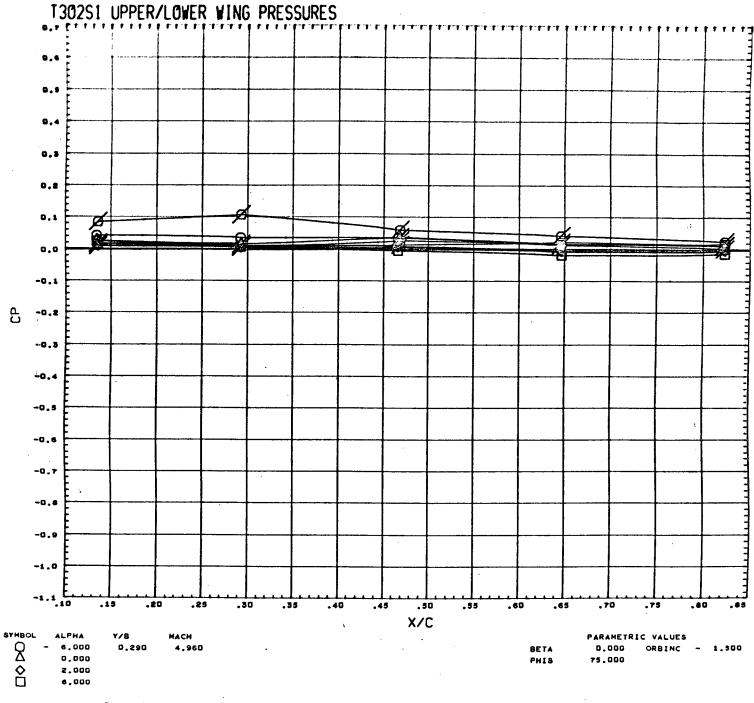
(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73006) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

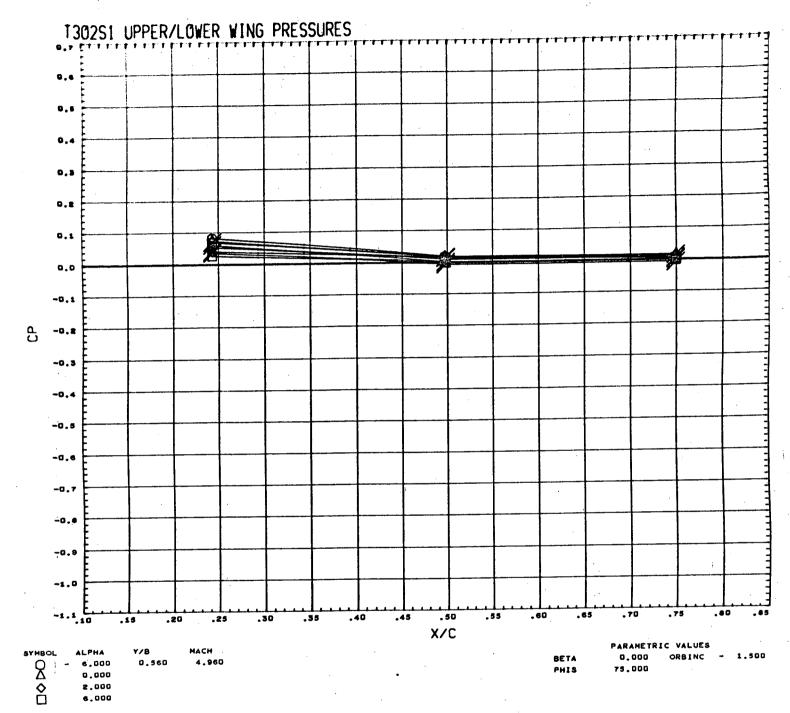
(C73006) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873007) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

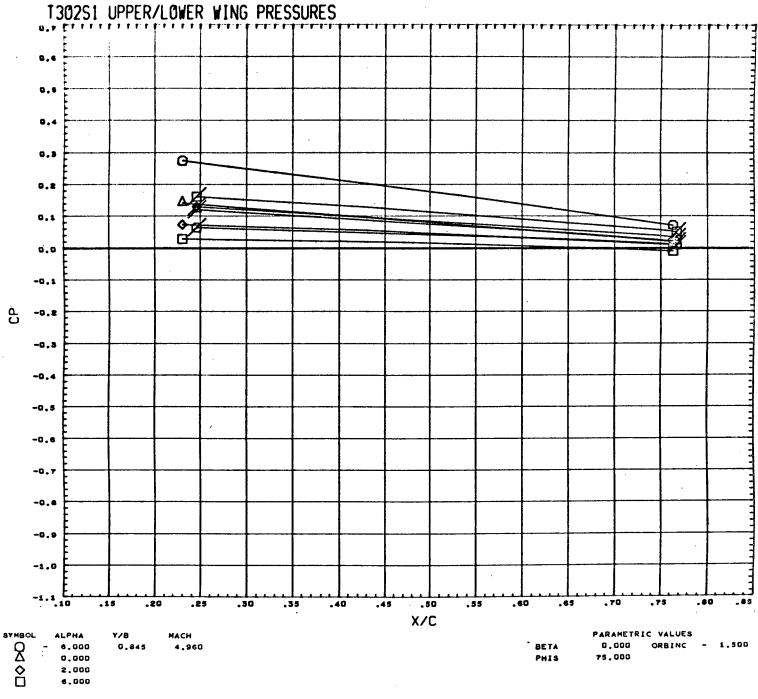
(C73007) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

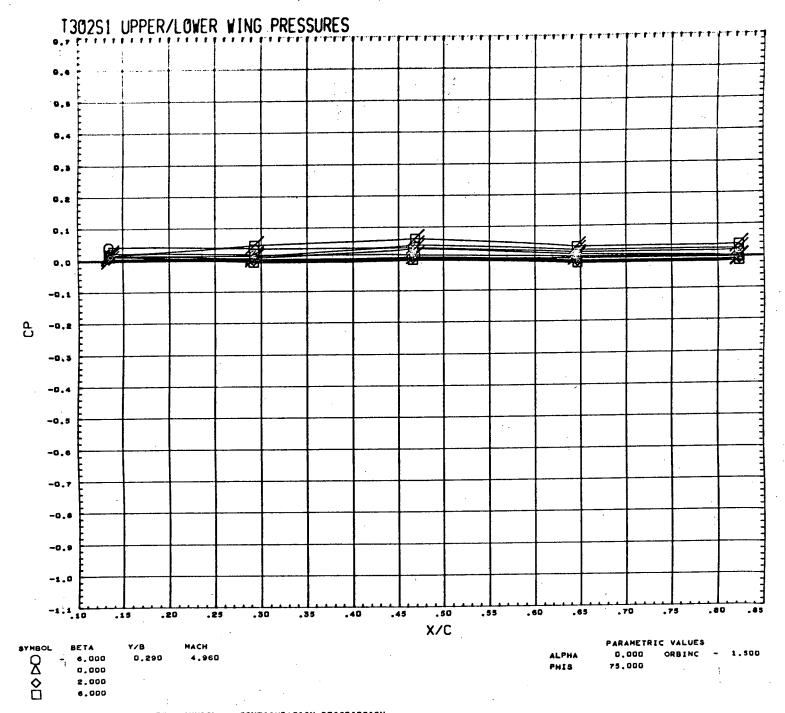
(873007) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

(C73007) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

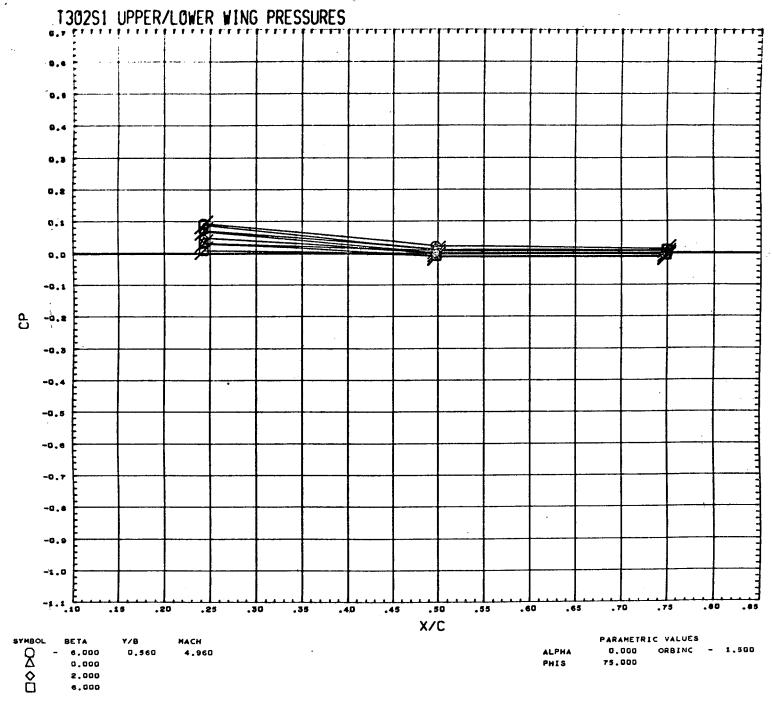
(873007) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING
(C73007) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

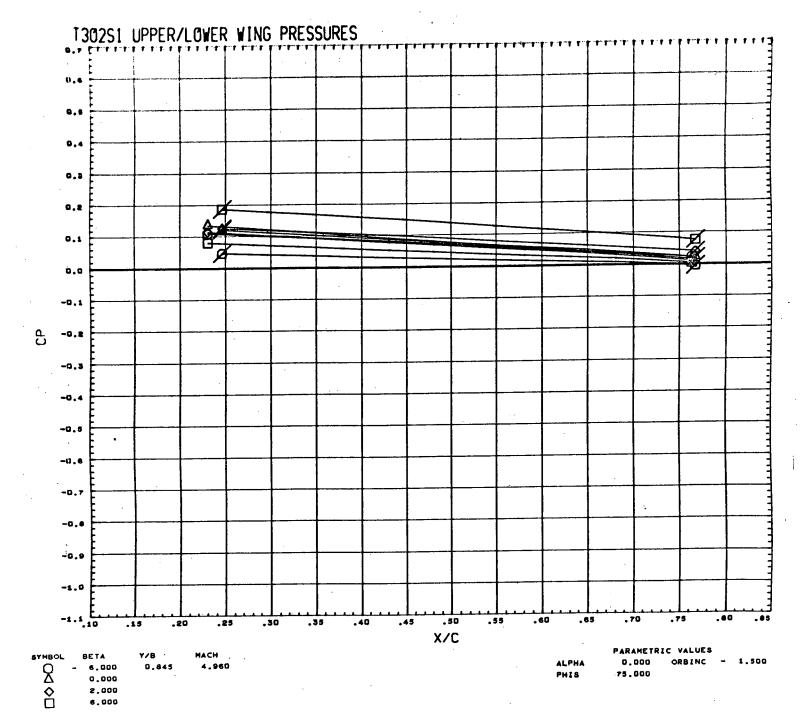
(873008) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

(C73008) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

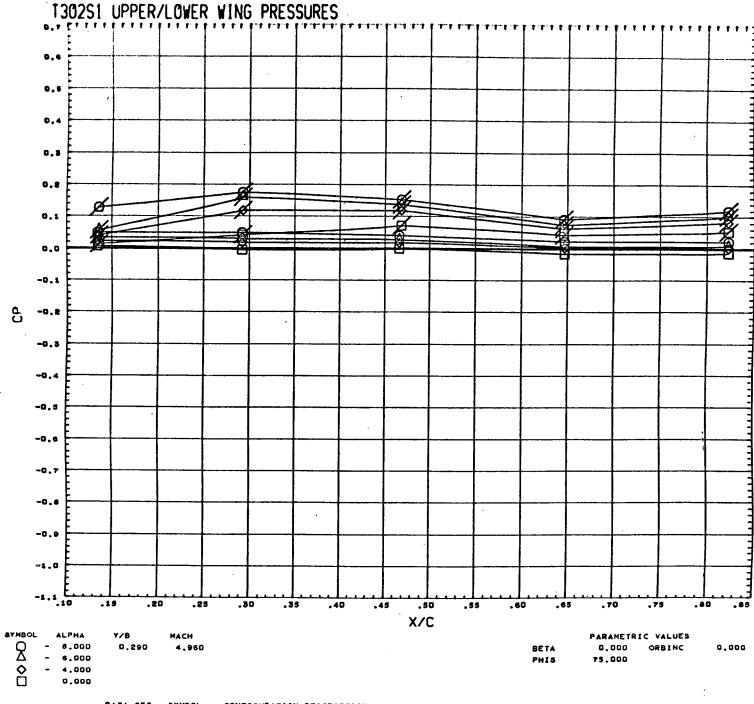


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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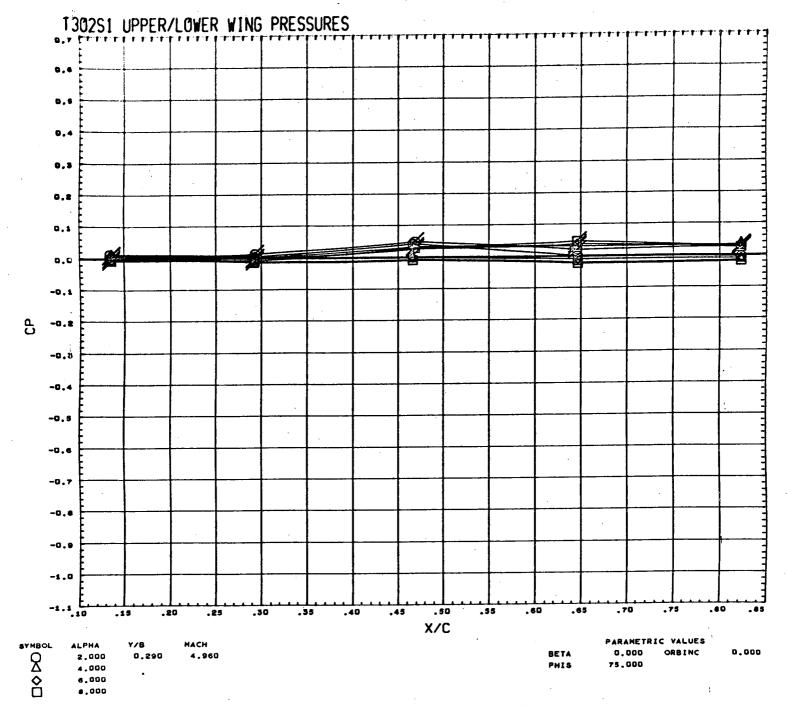
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DATA SET SYMBOL CONFIGURATION DESCRIPTION

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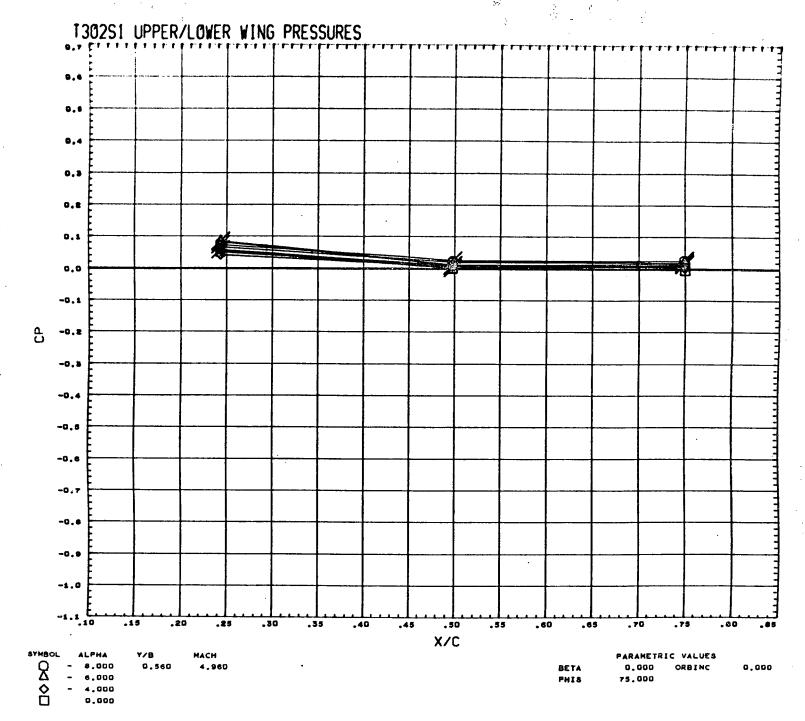
(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



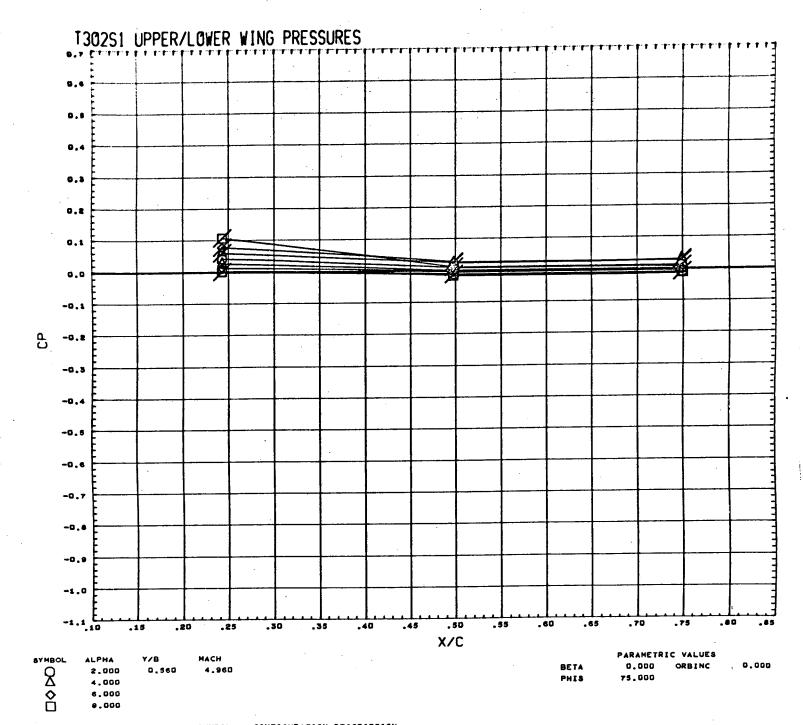
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(B73009) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING

(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



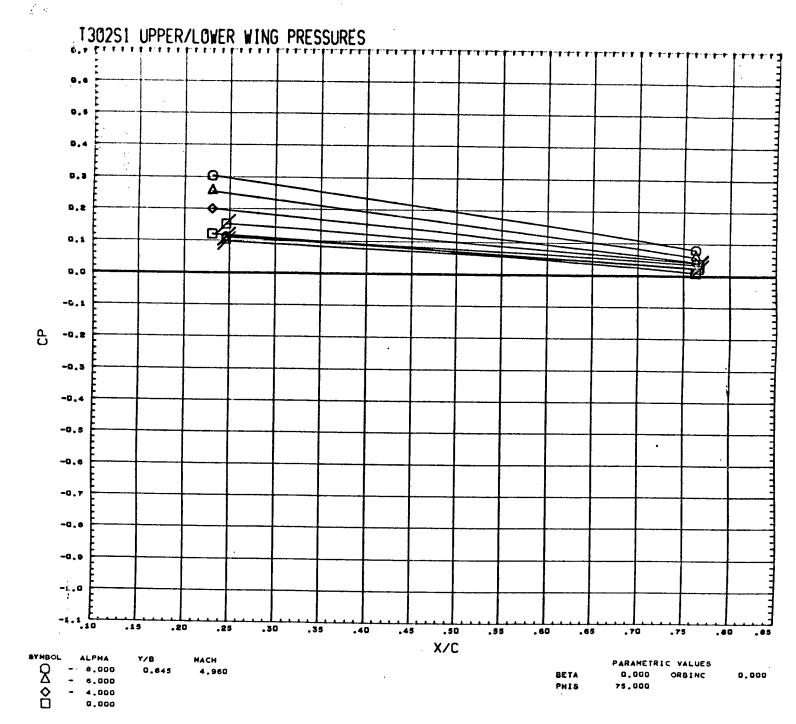
DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873009) . OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873009) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

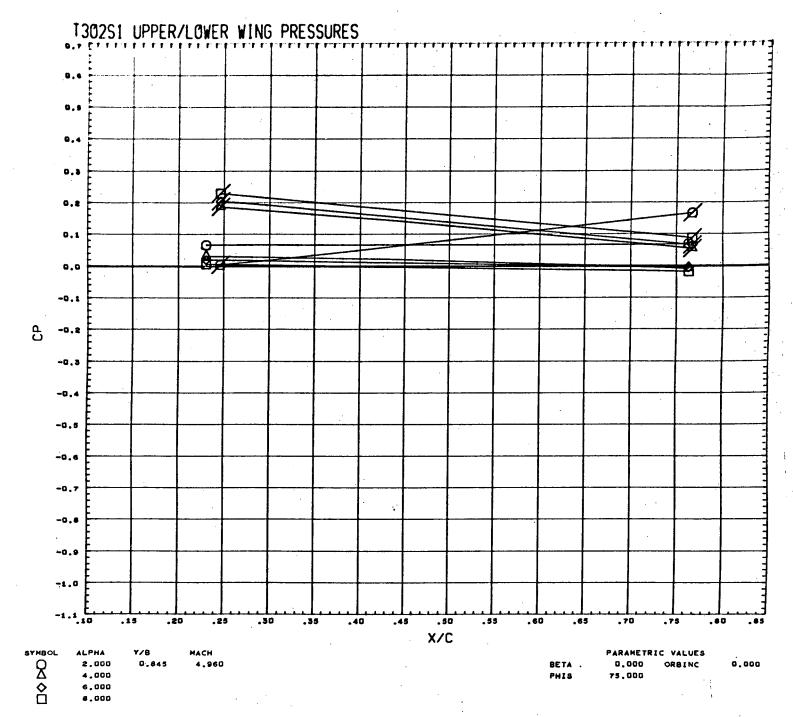
(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



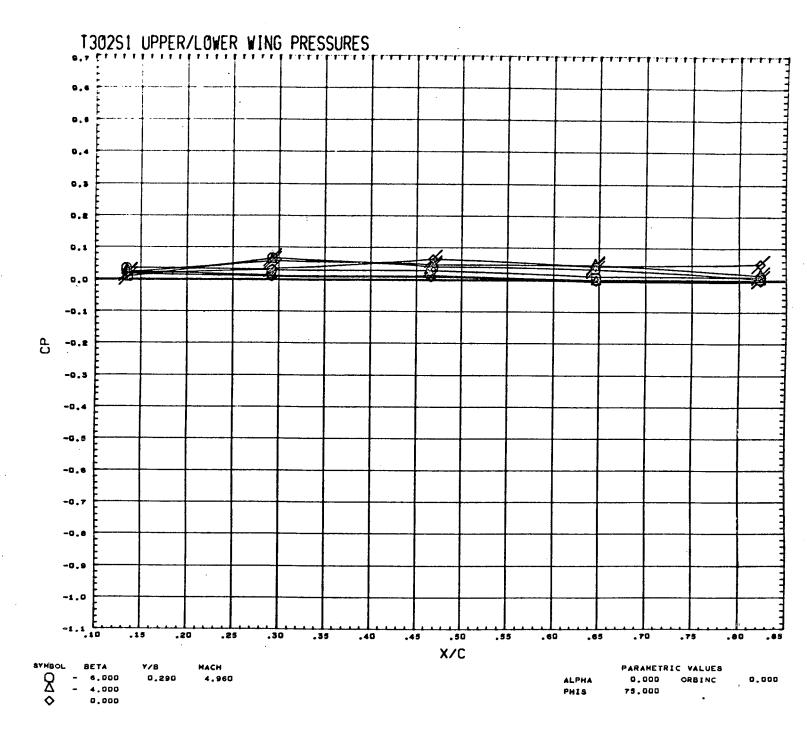
DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873009) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

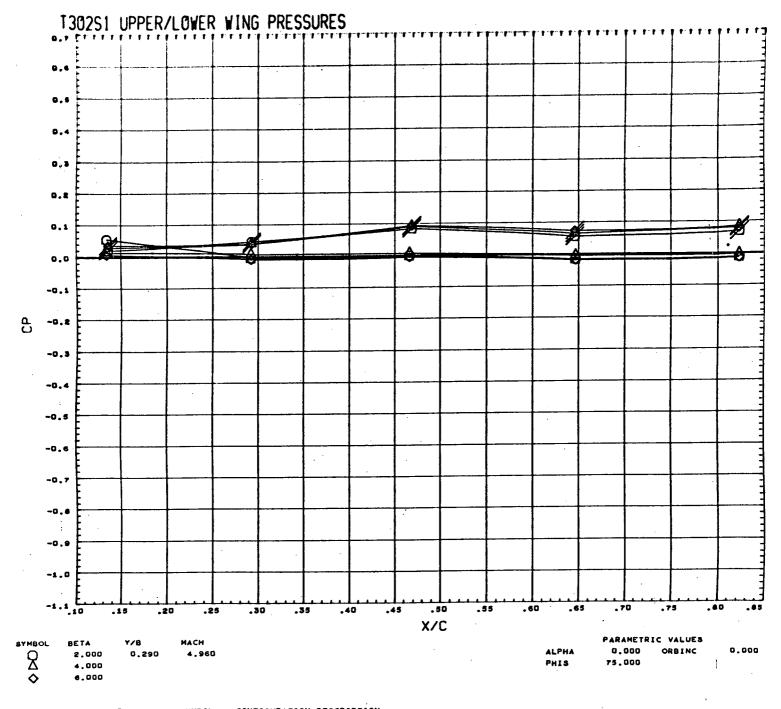


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873009) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING
(C73009) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873010) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C73010) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T502S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

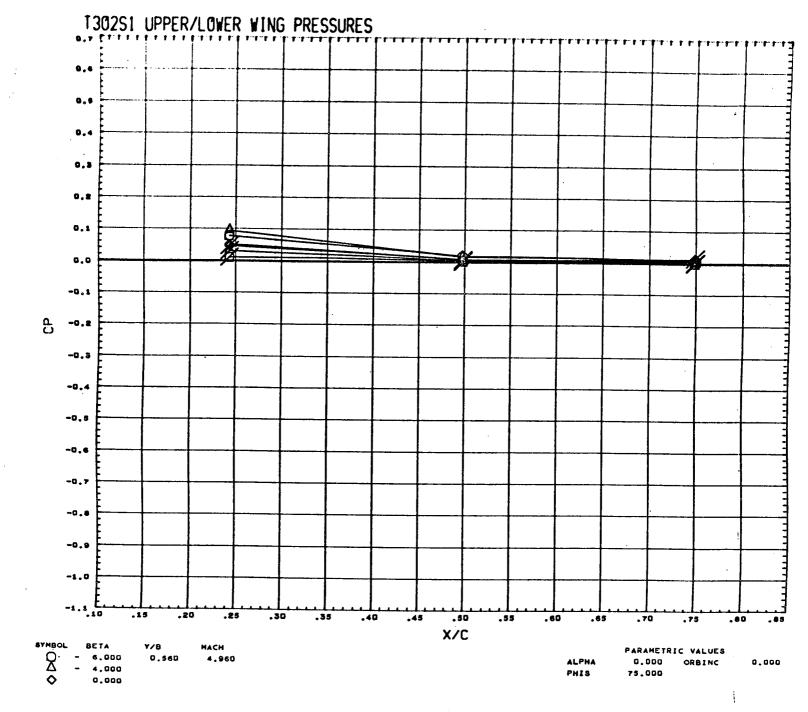
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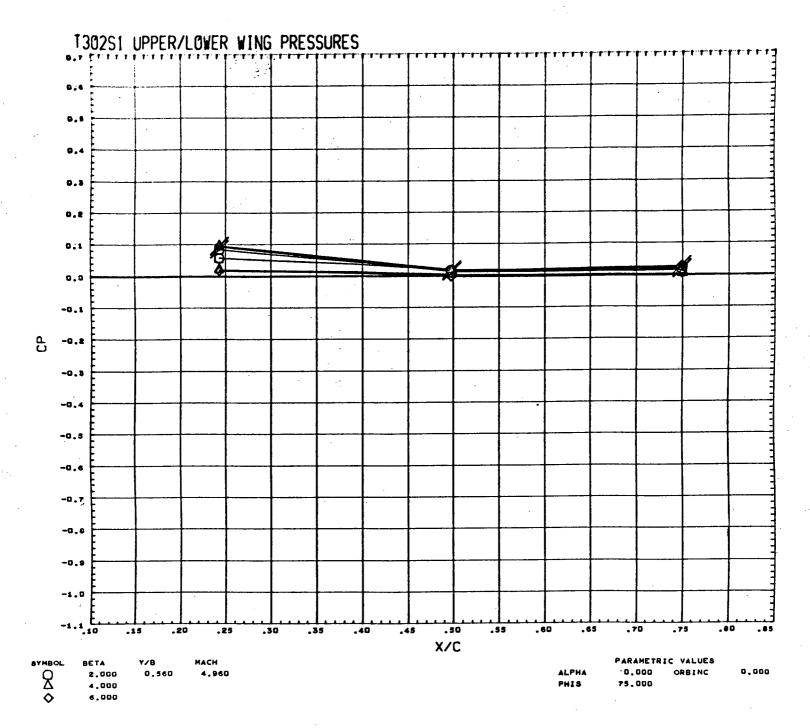
(C73010) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

DATA SET SYMBOL CONFIGURATION DESCRIPTION

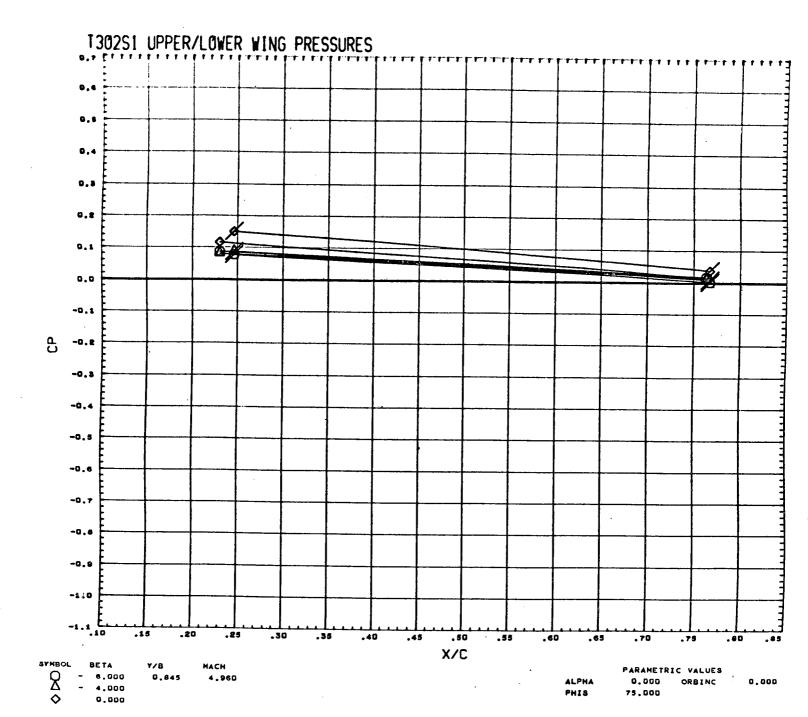
(873010) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

(C73010) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING





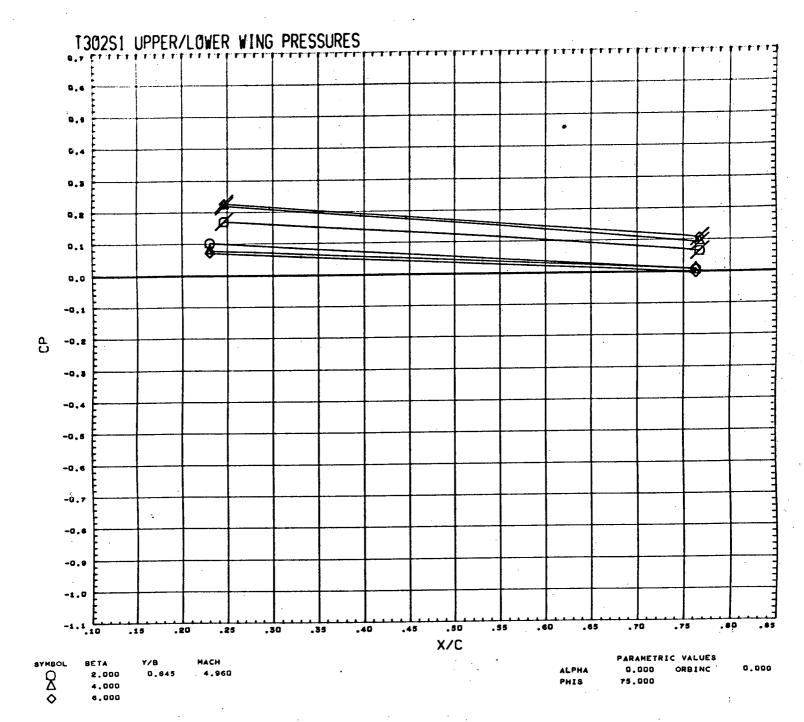
DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873010) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C7301D) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

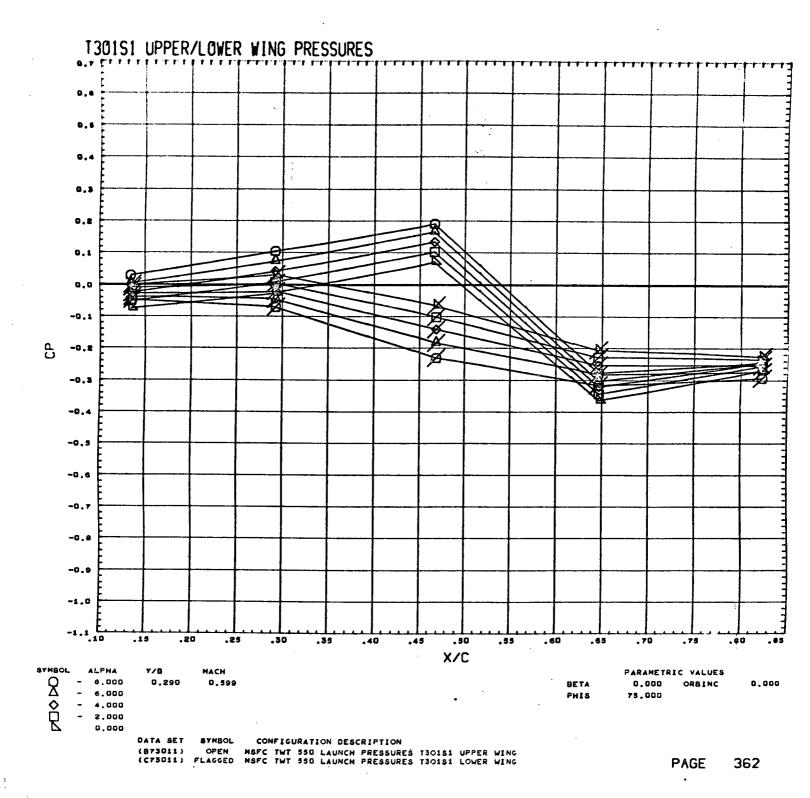
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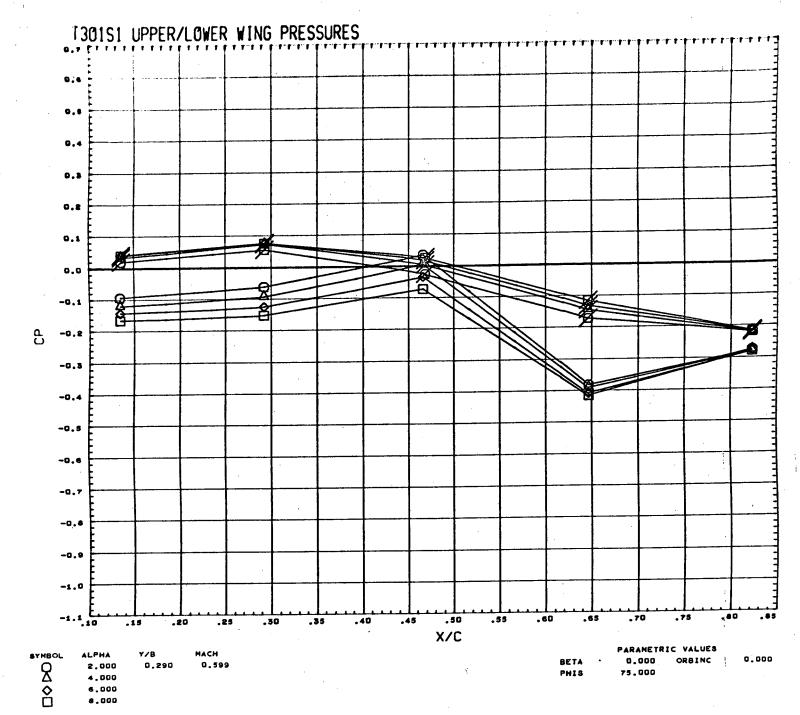
(C73010) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

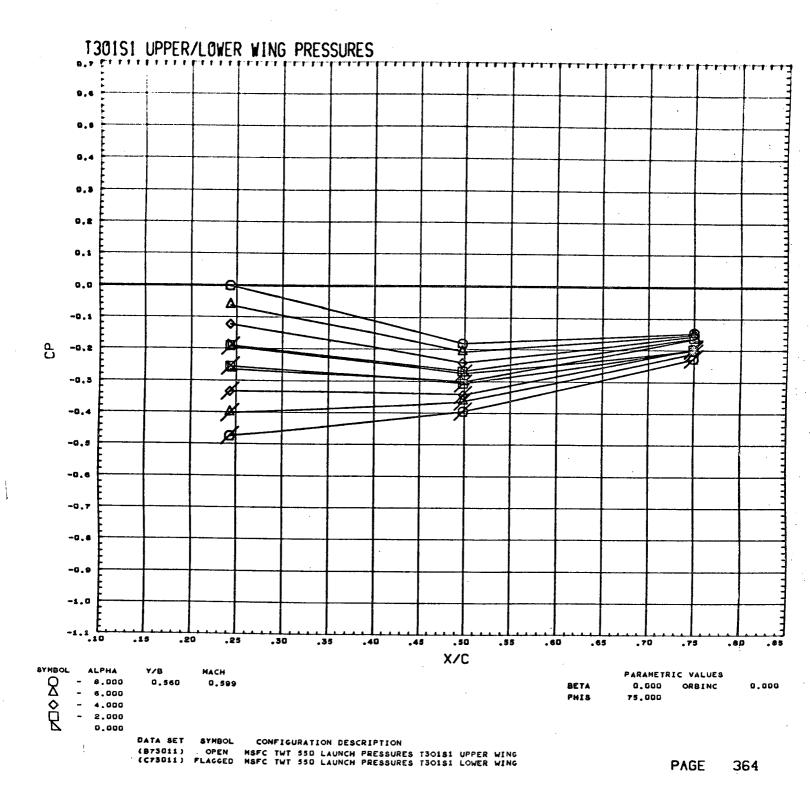
(873010) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C73010) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

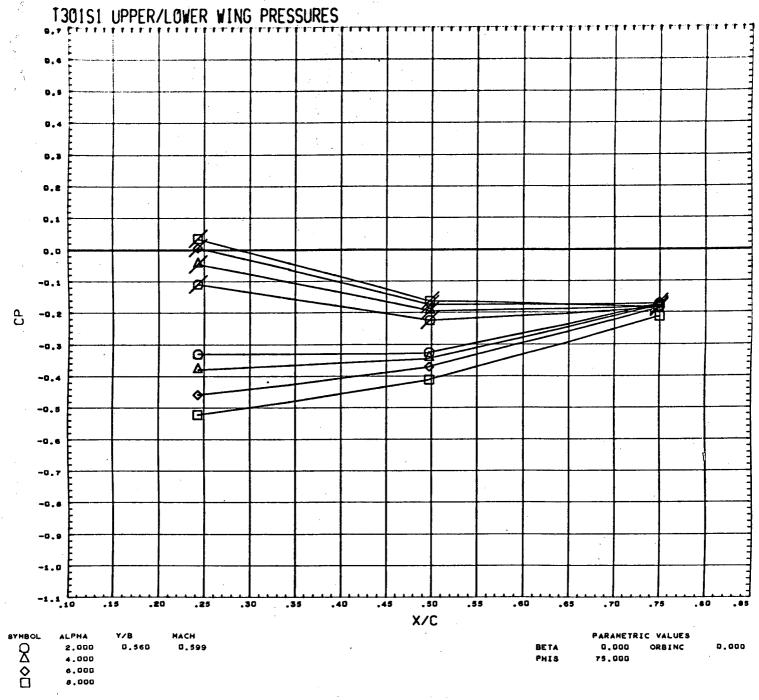


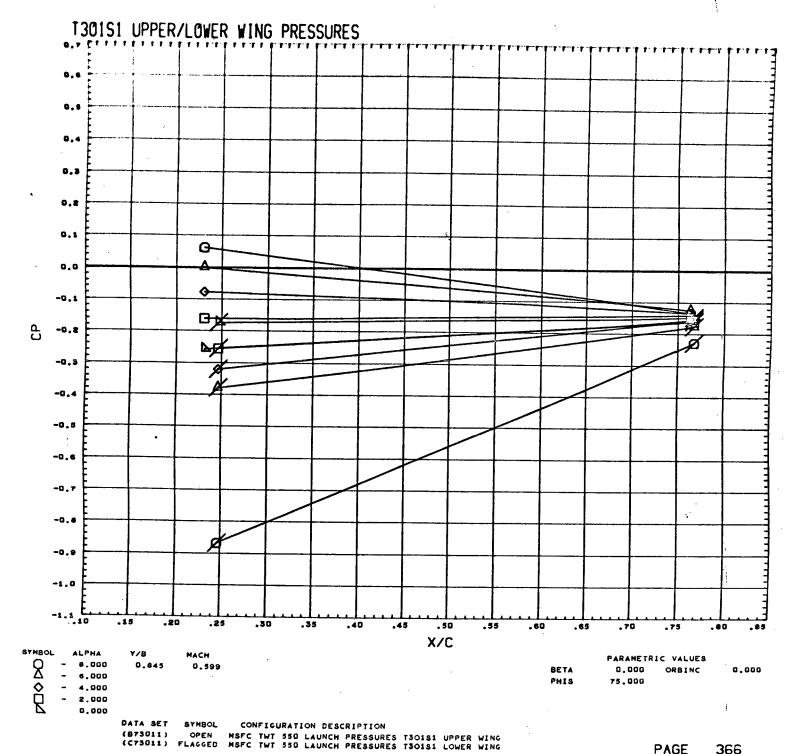


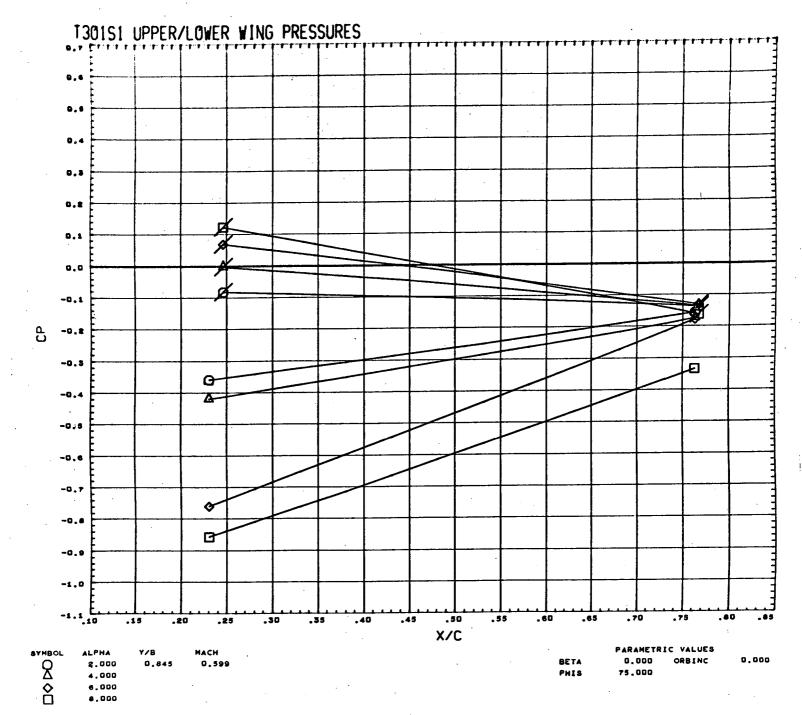
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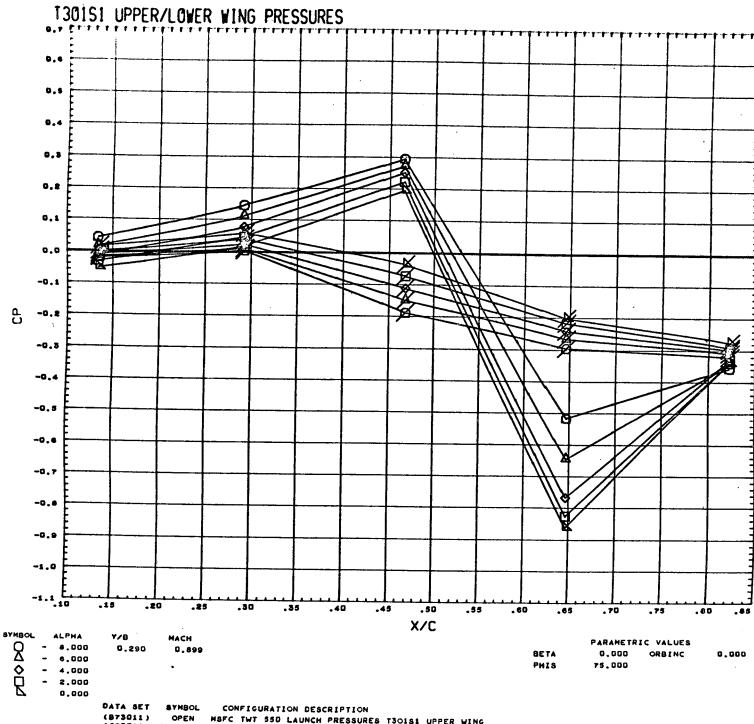
(873011) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
(C73011) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



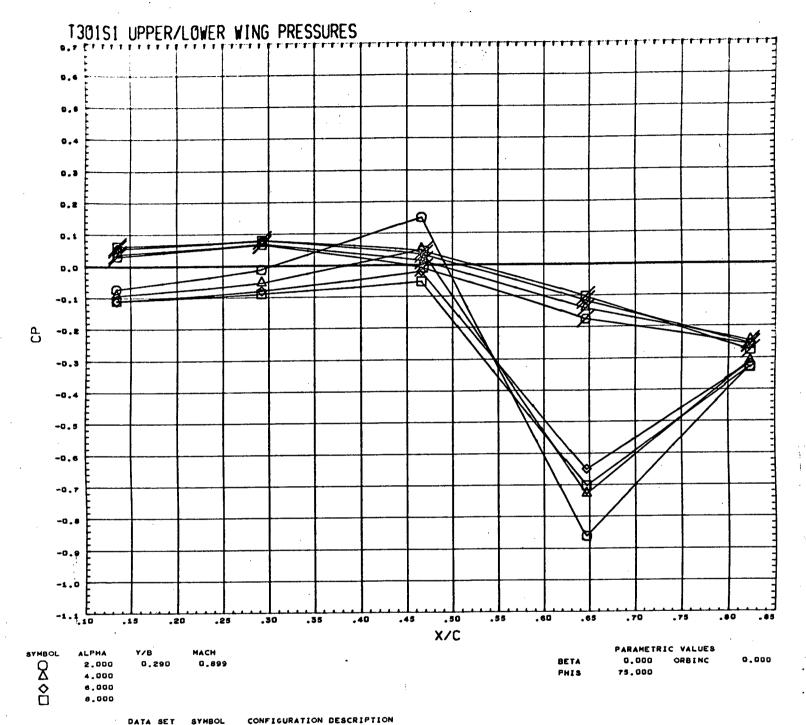


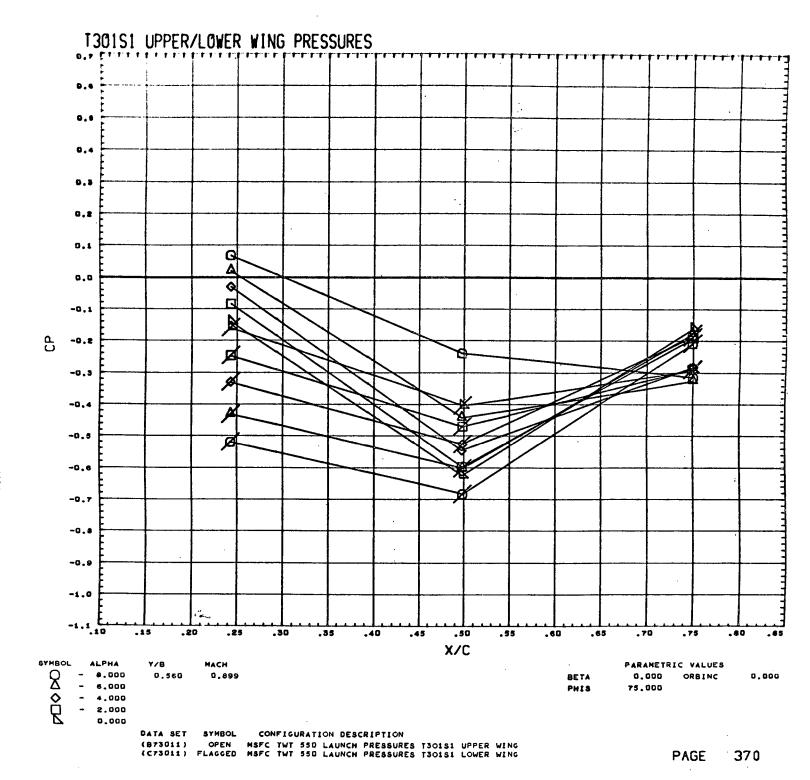


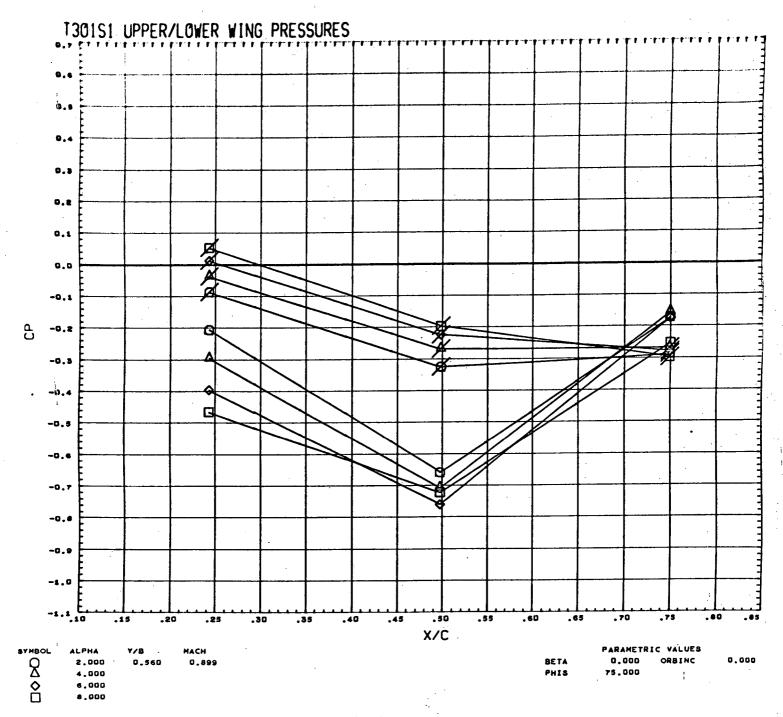


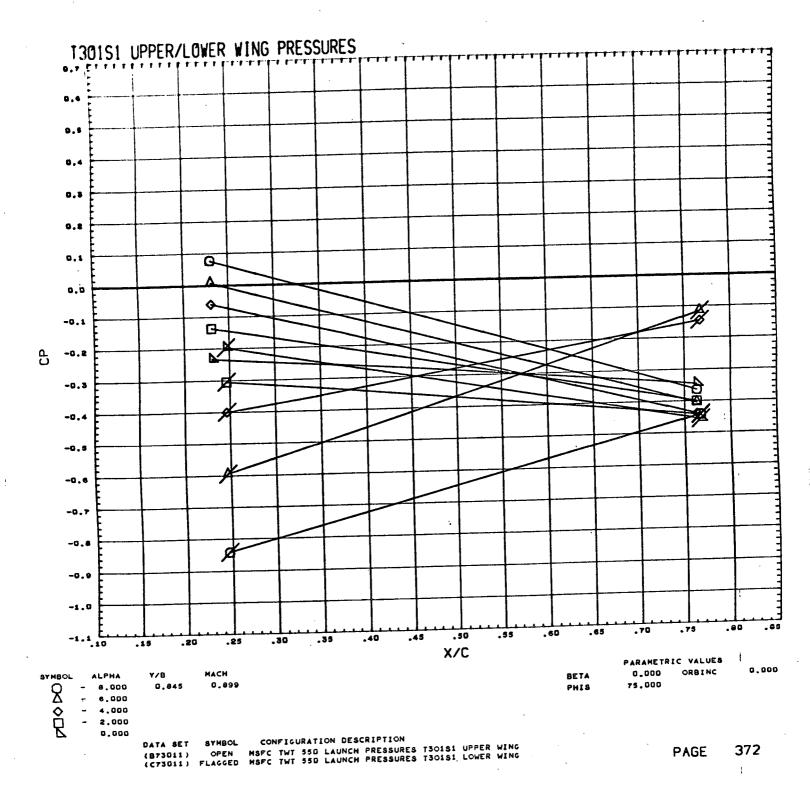


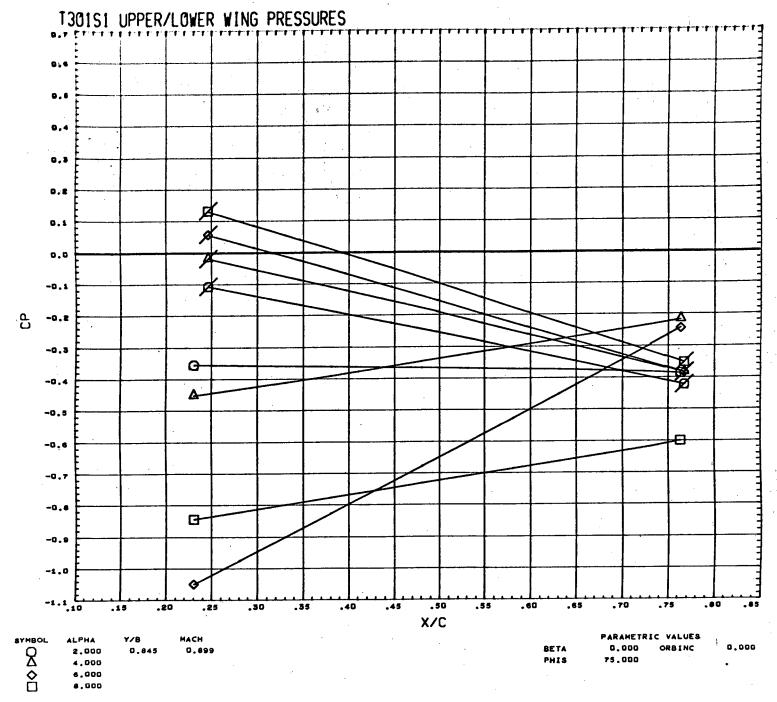
(873011) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73011) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

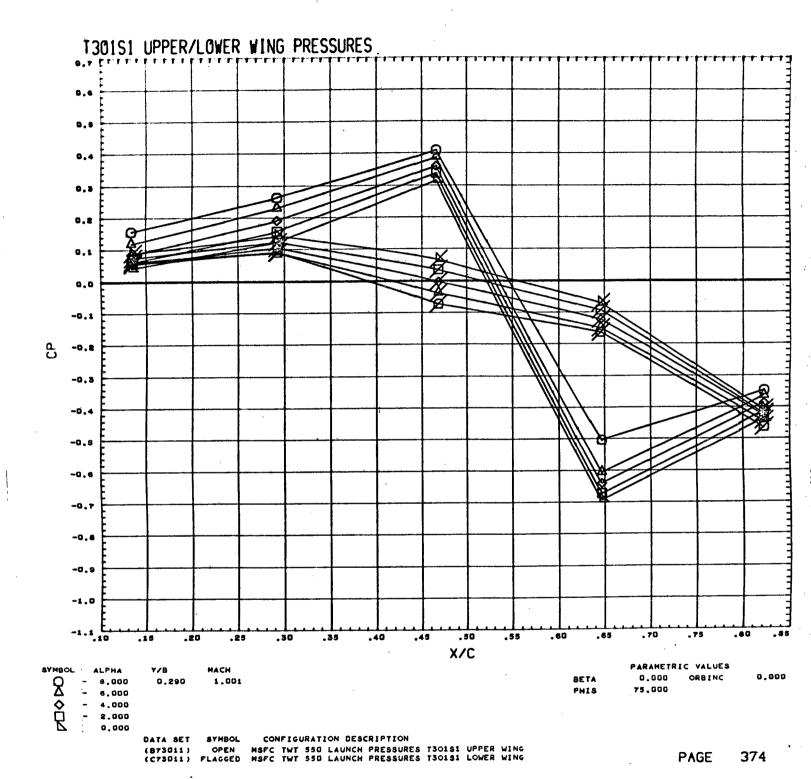


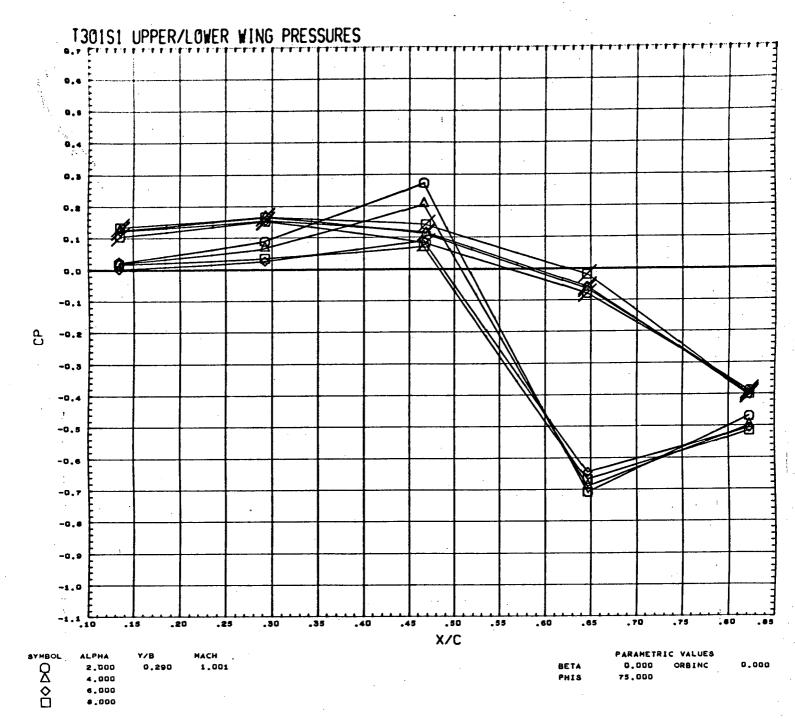


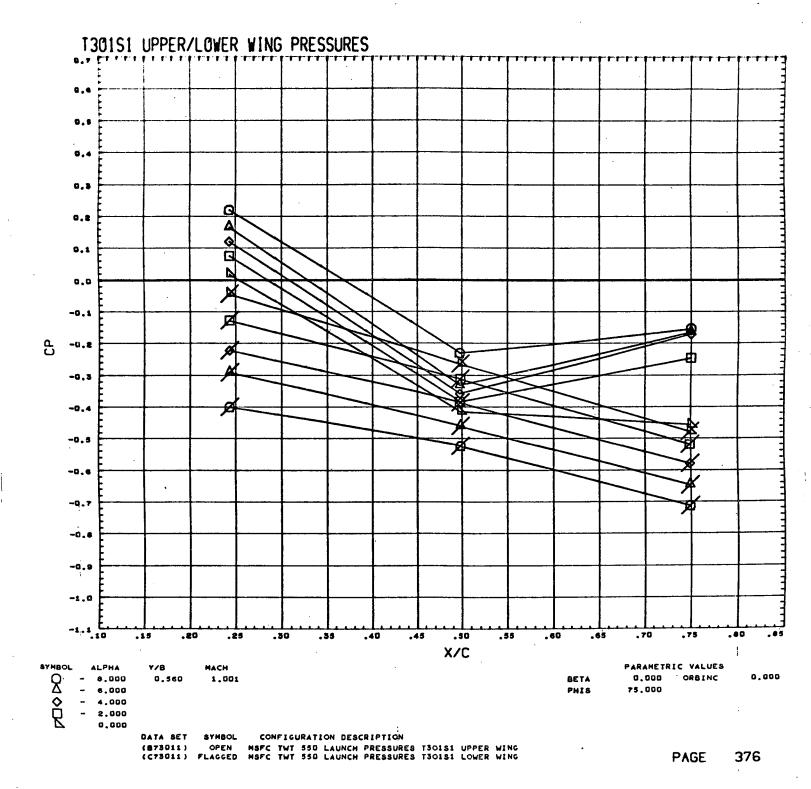


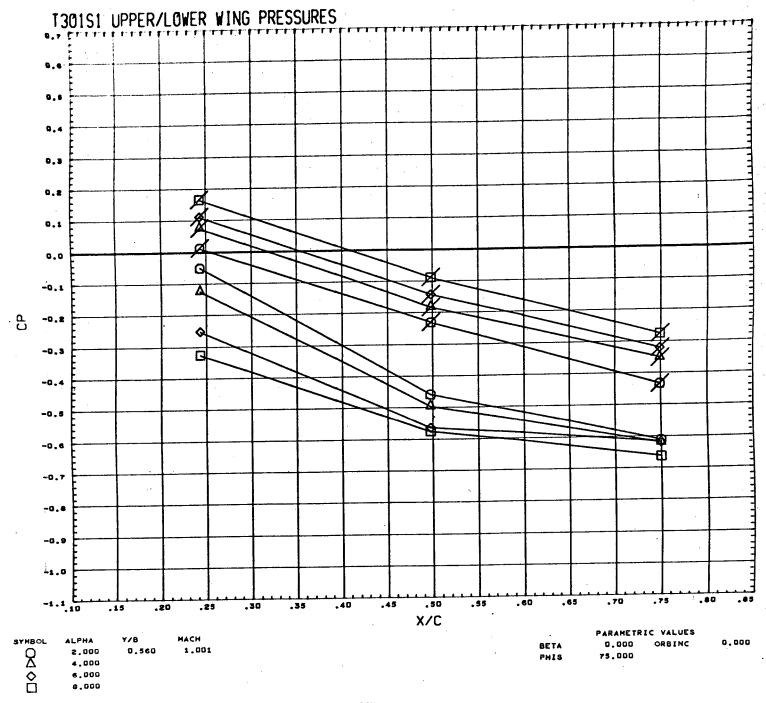


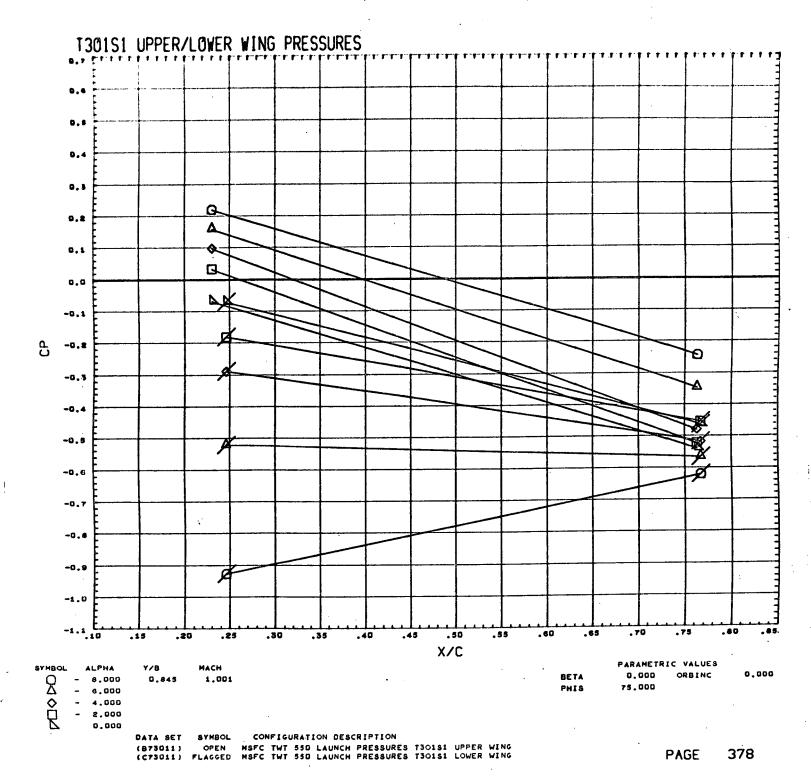


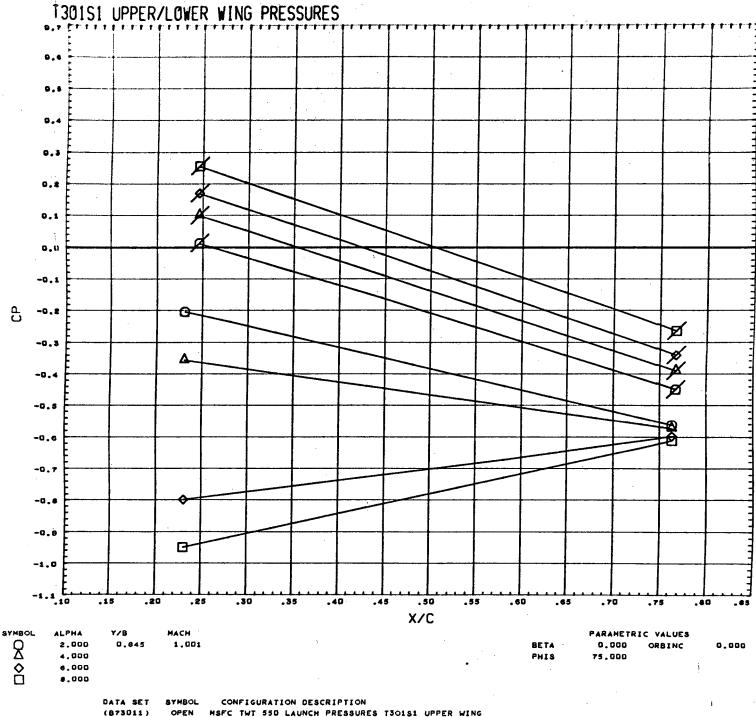




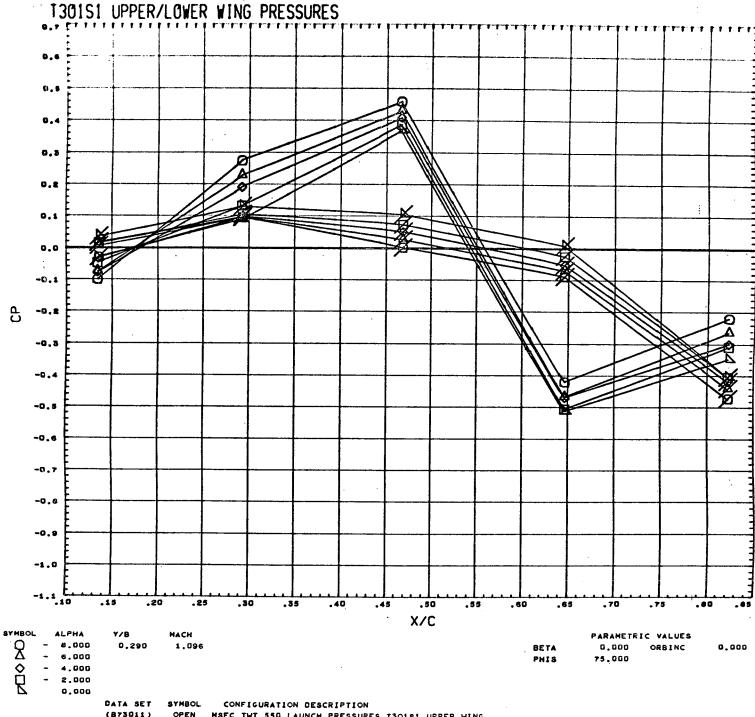




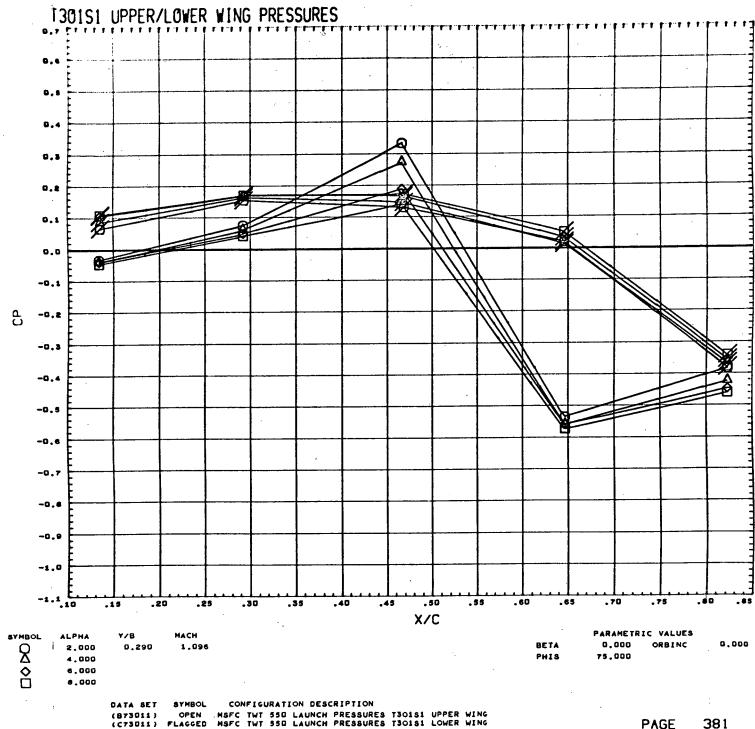




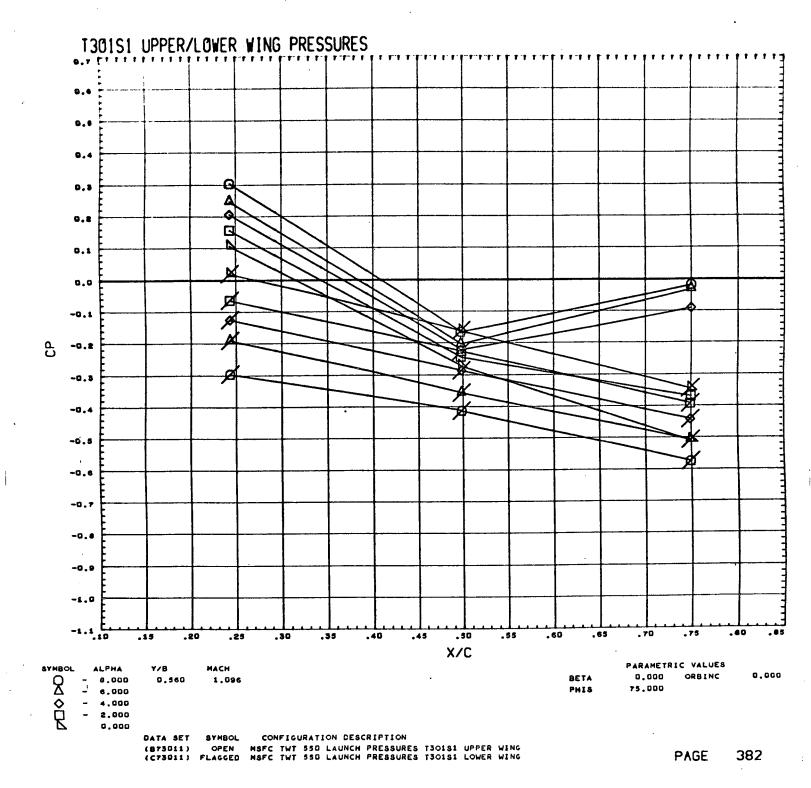
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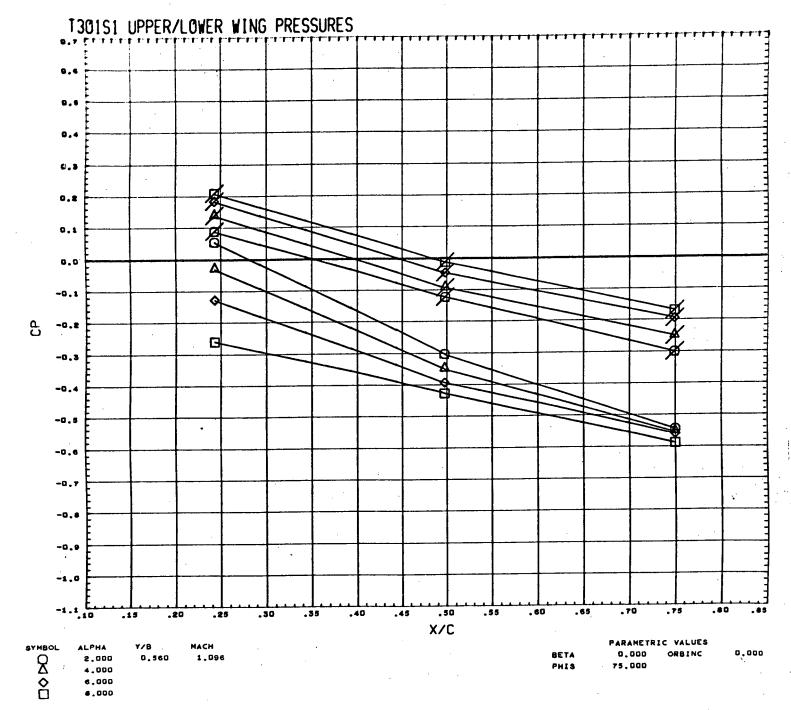


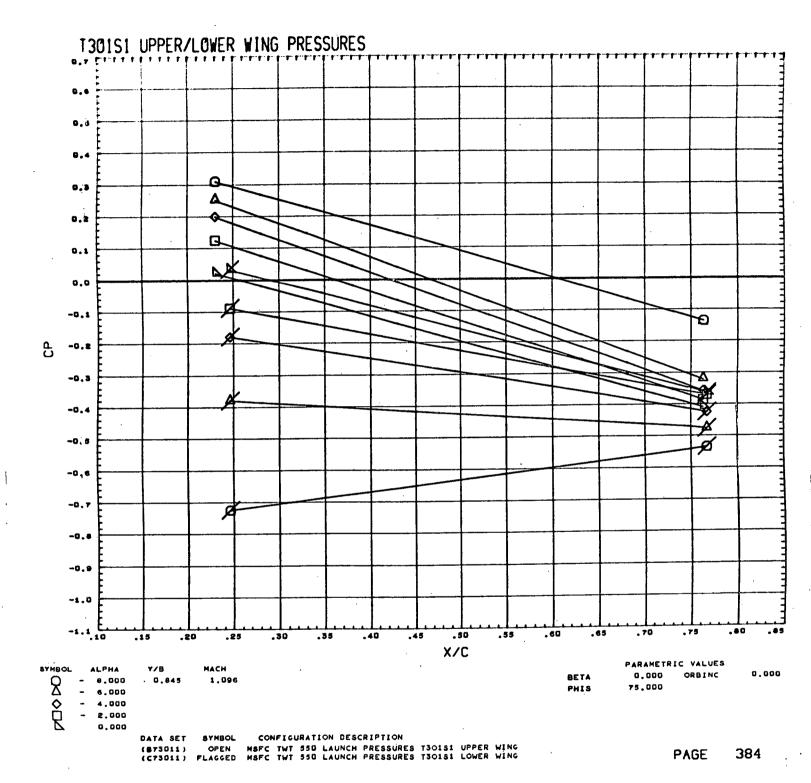
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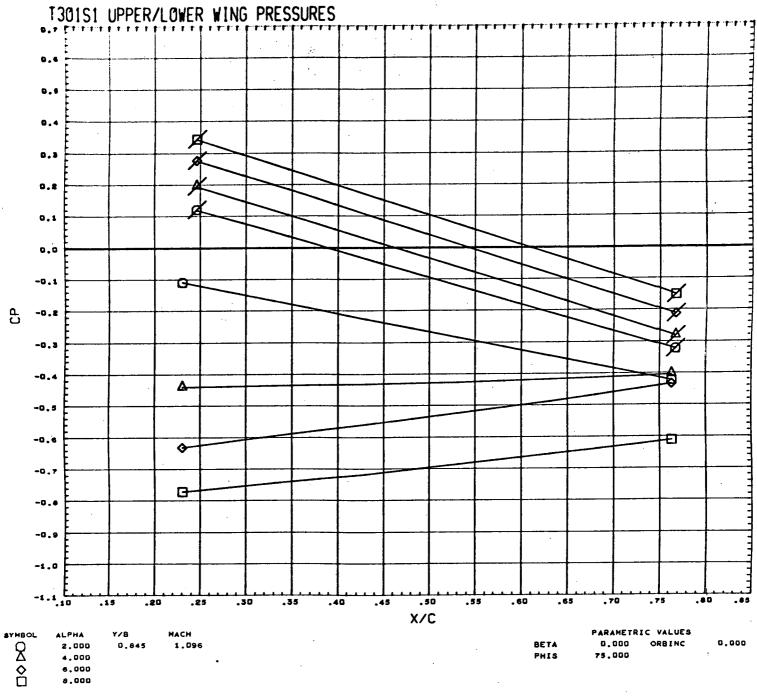


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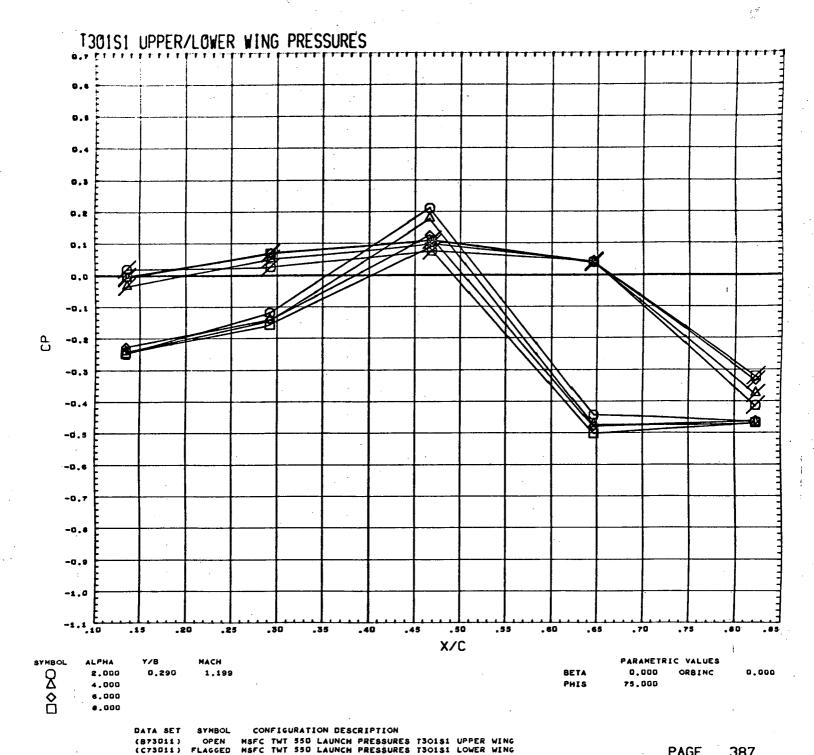




T301S1 UPPER/LOWER WING PRESSURES

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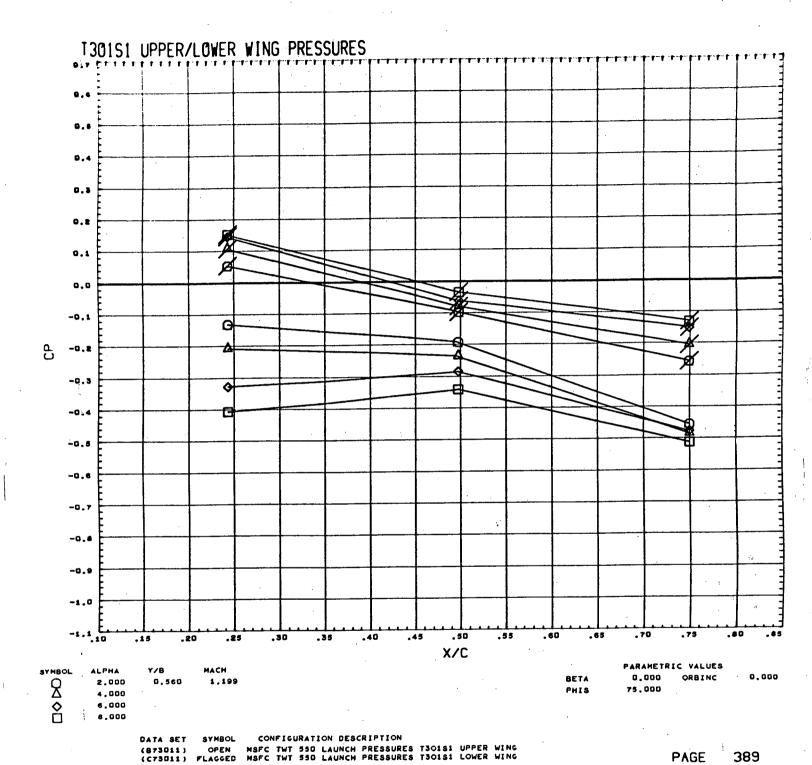
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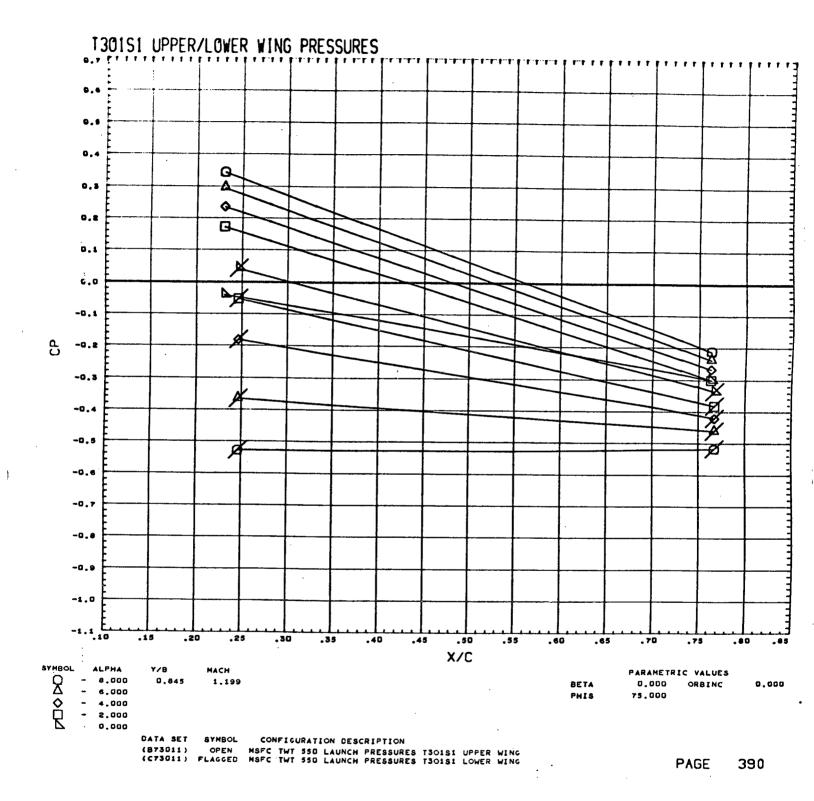


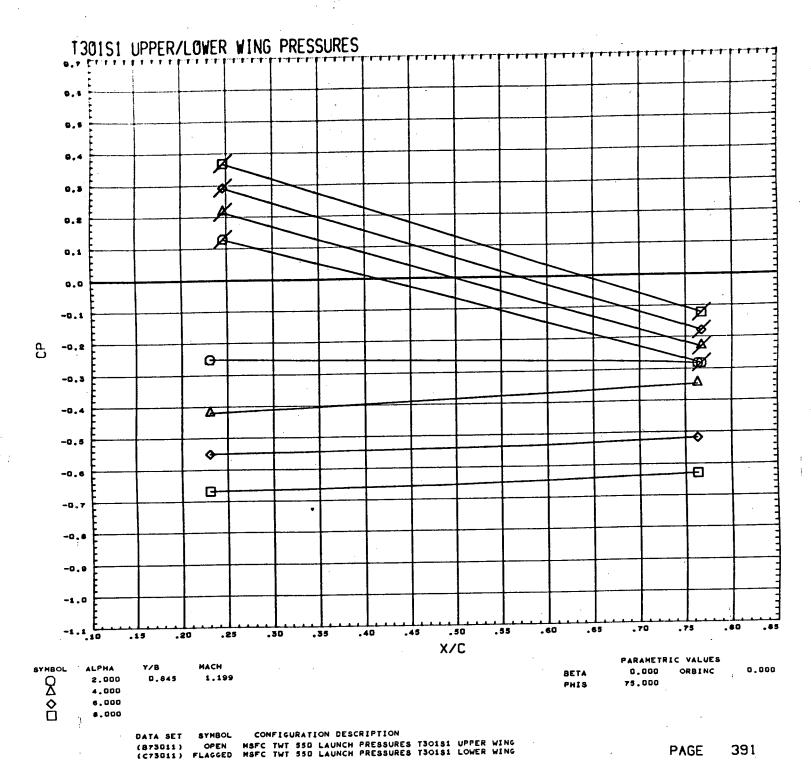
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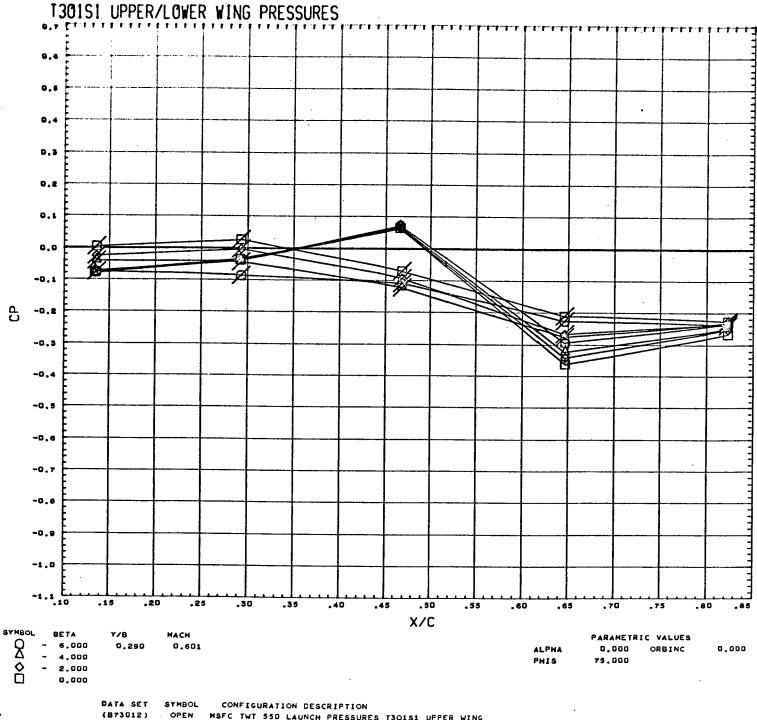
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T301S1 UPPER/LOWER WING PRESSURES

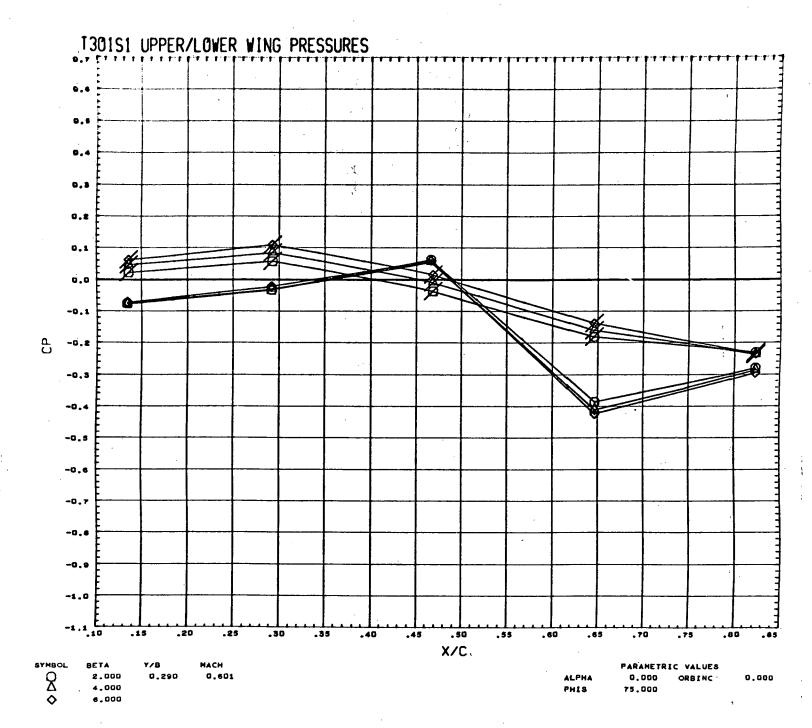


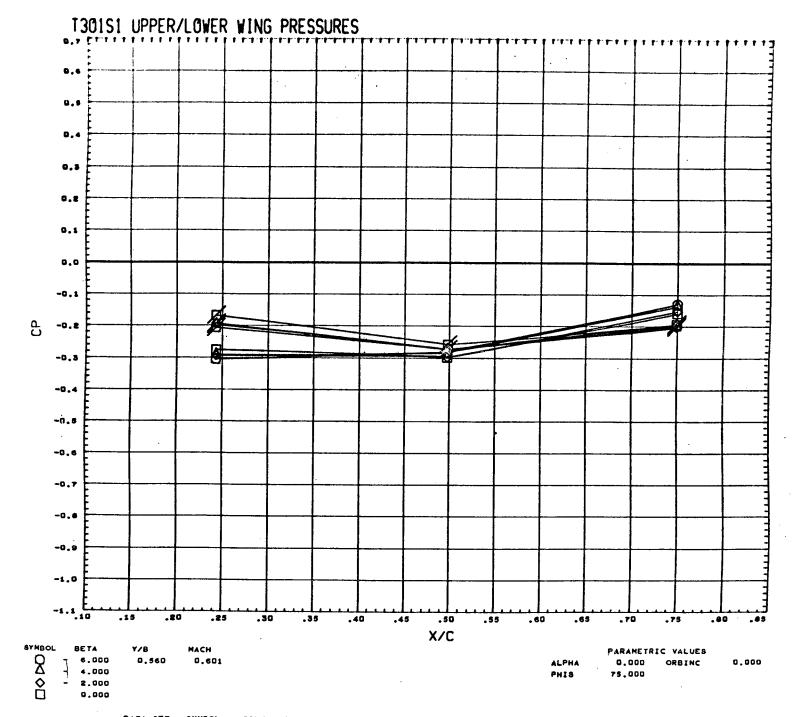


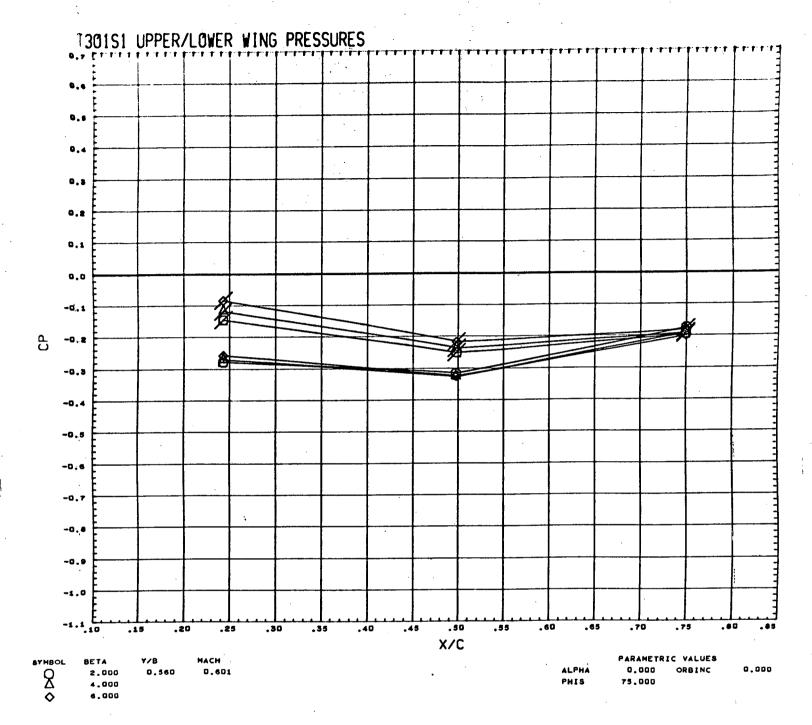


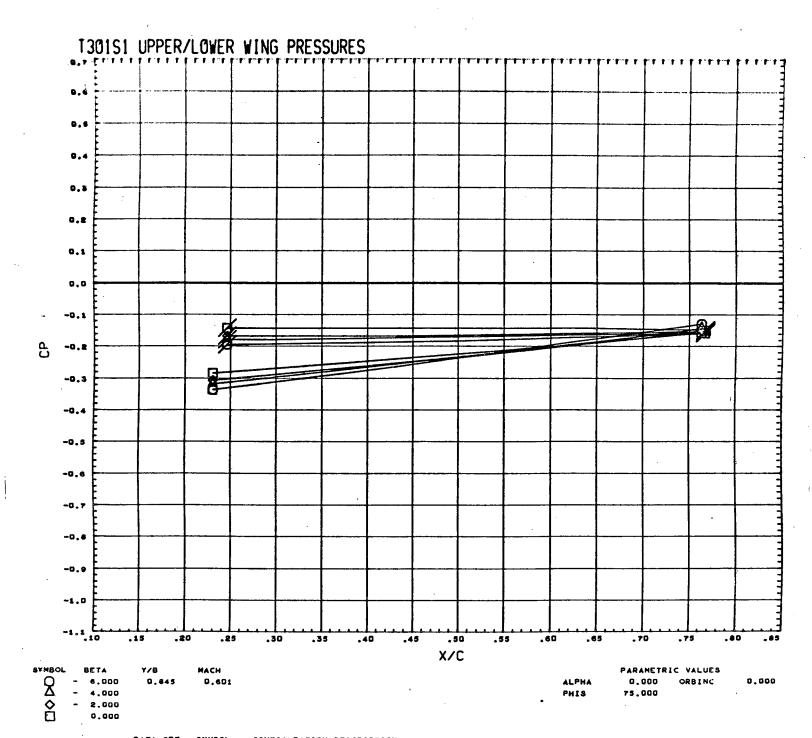


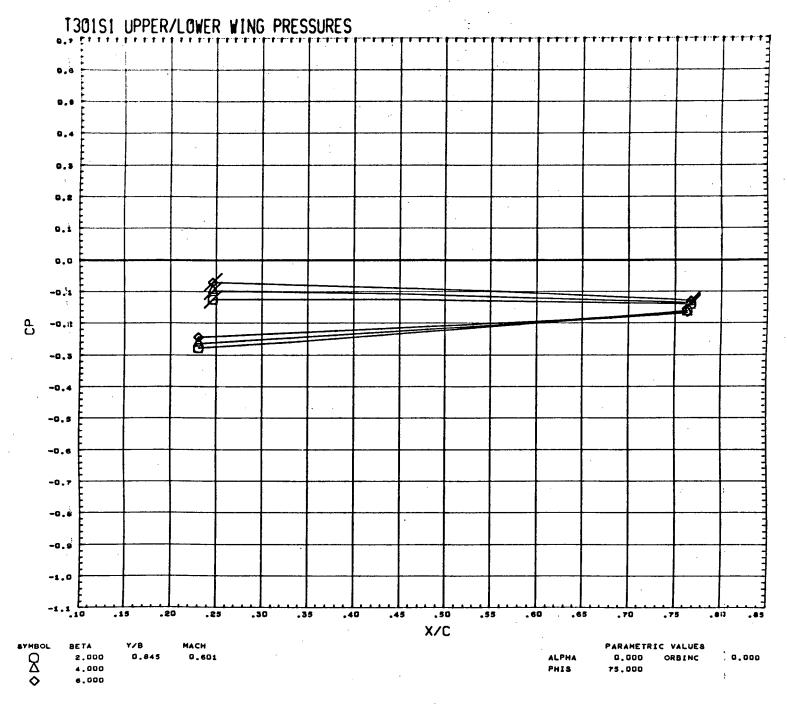
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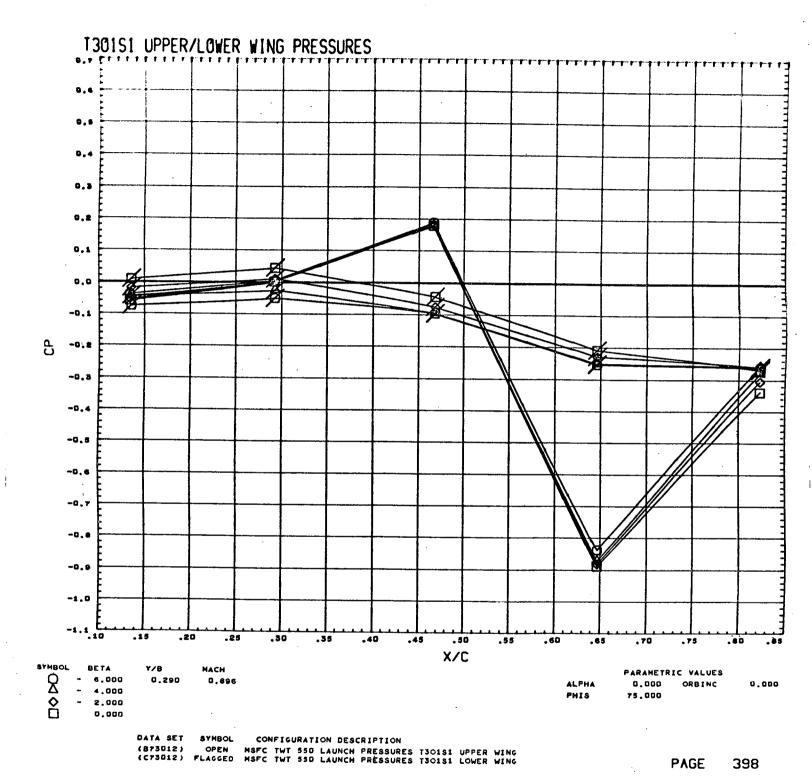




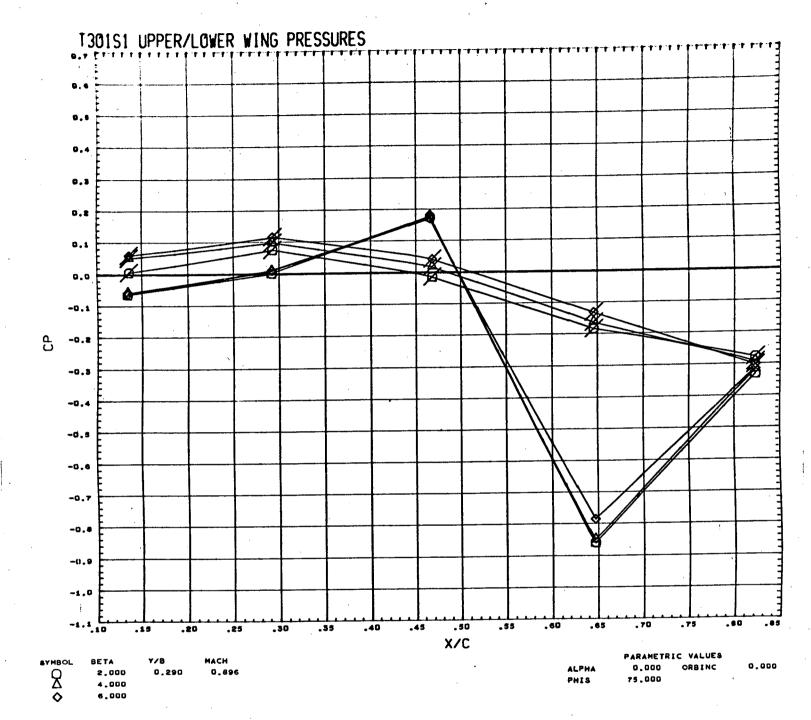


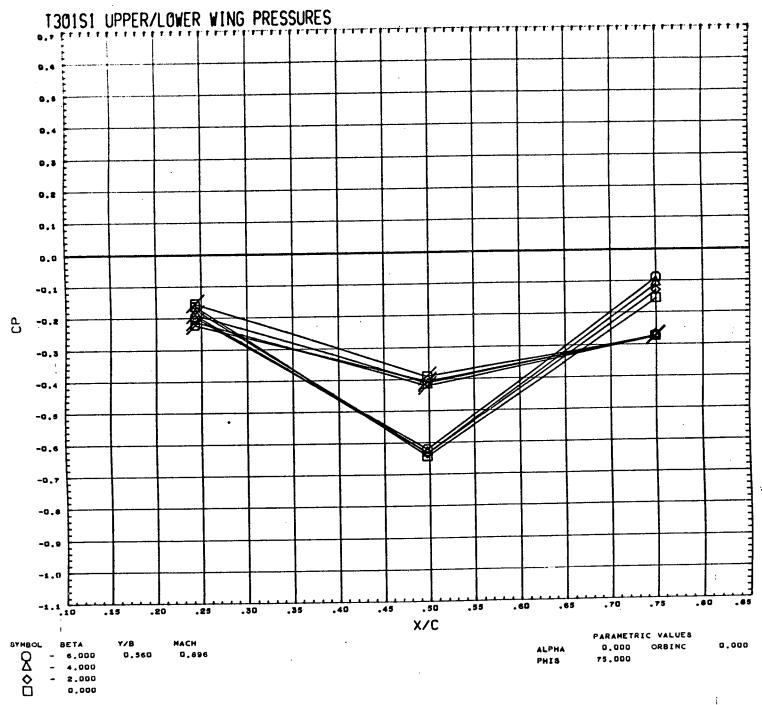






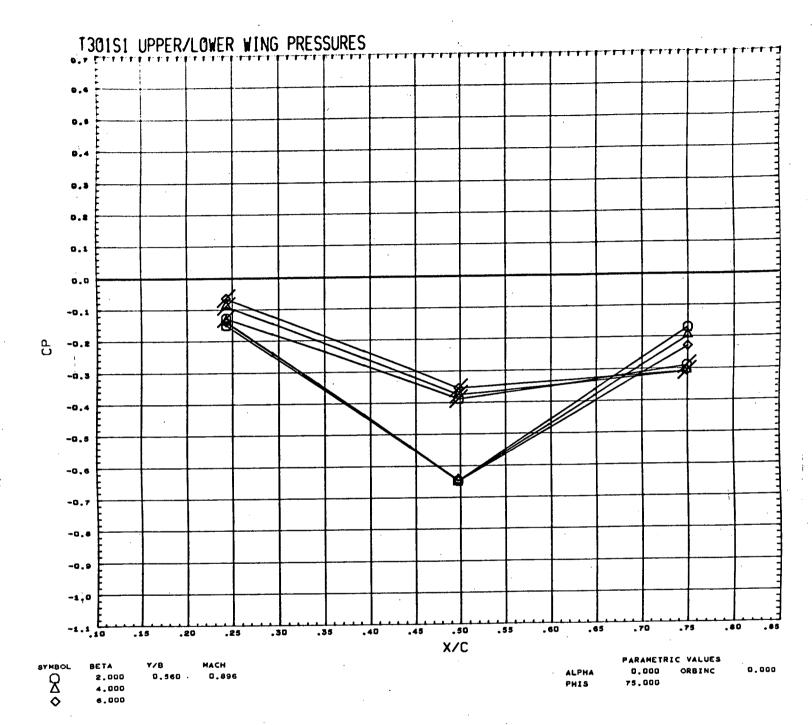
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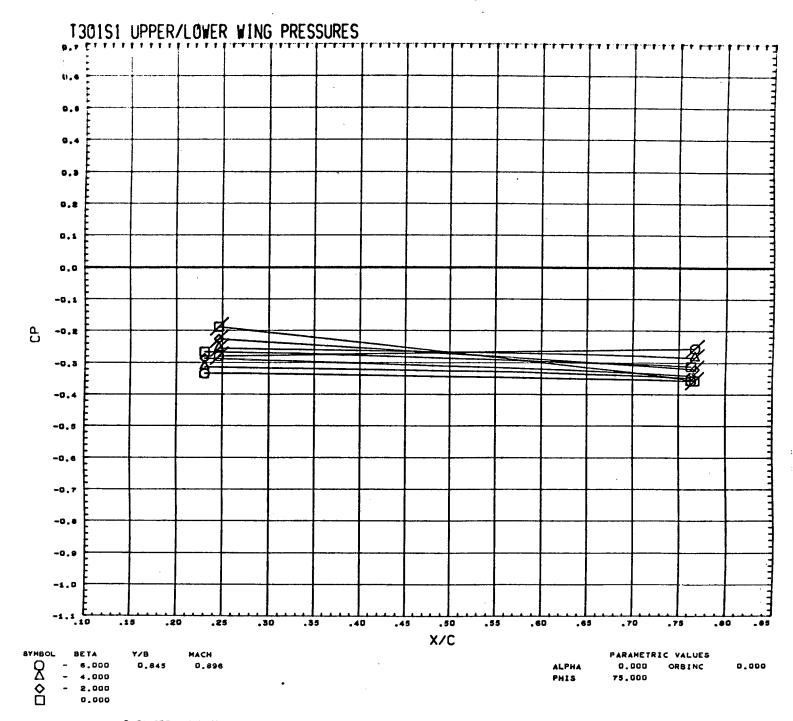


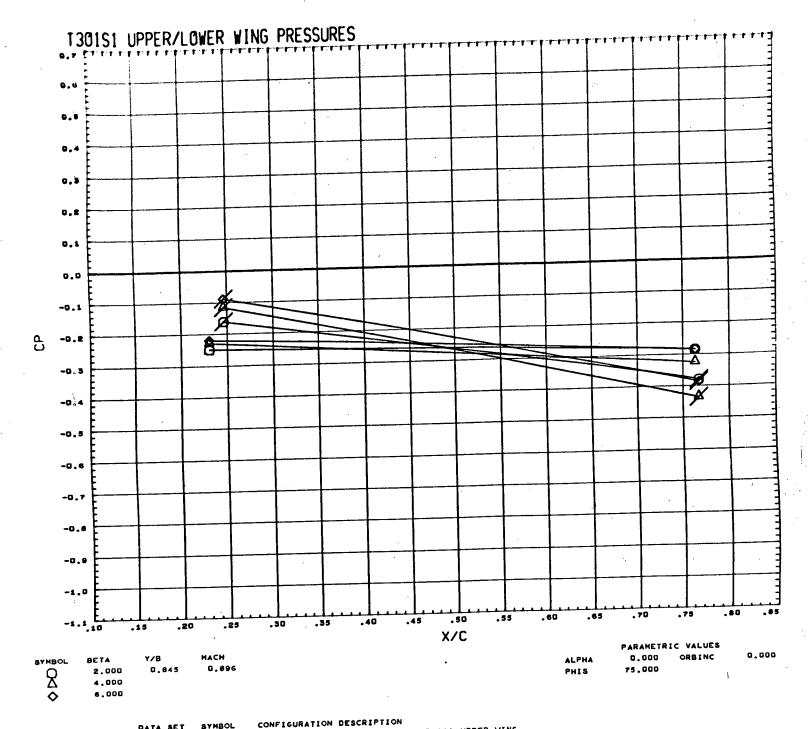


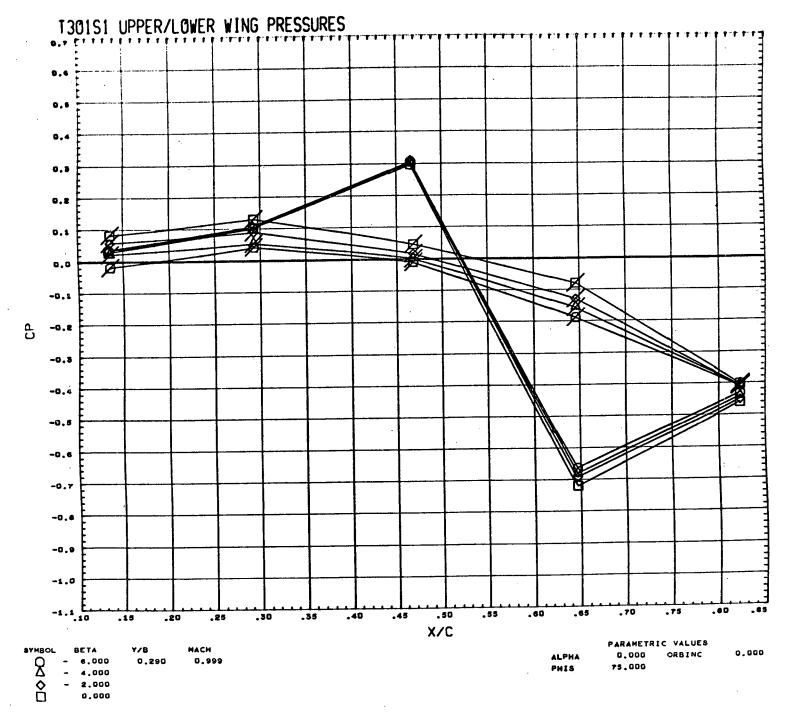
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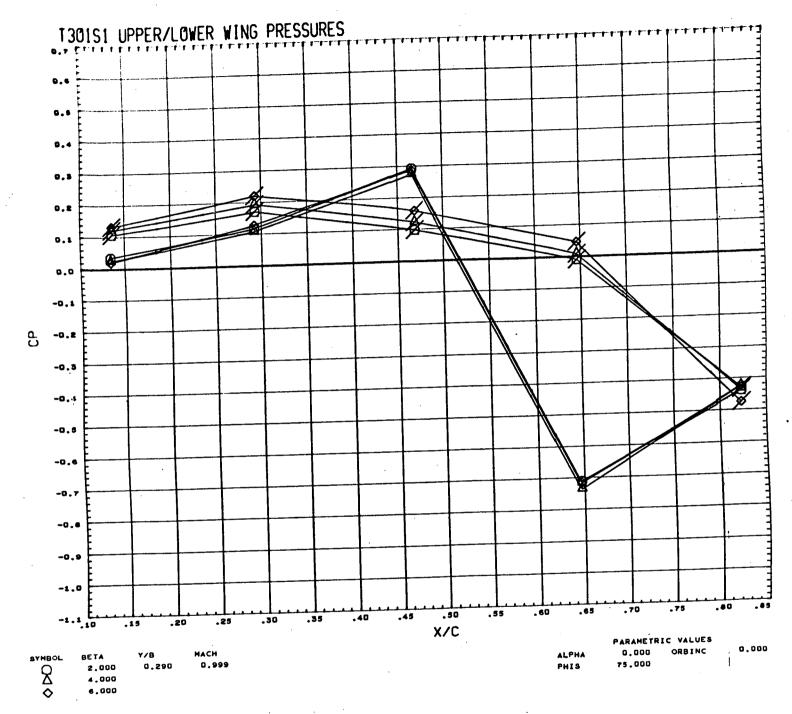
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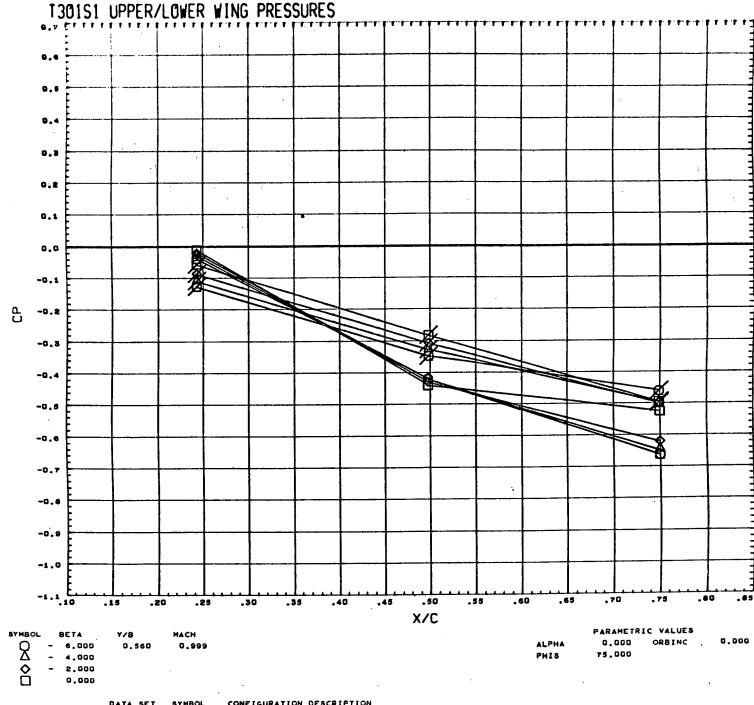


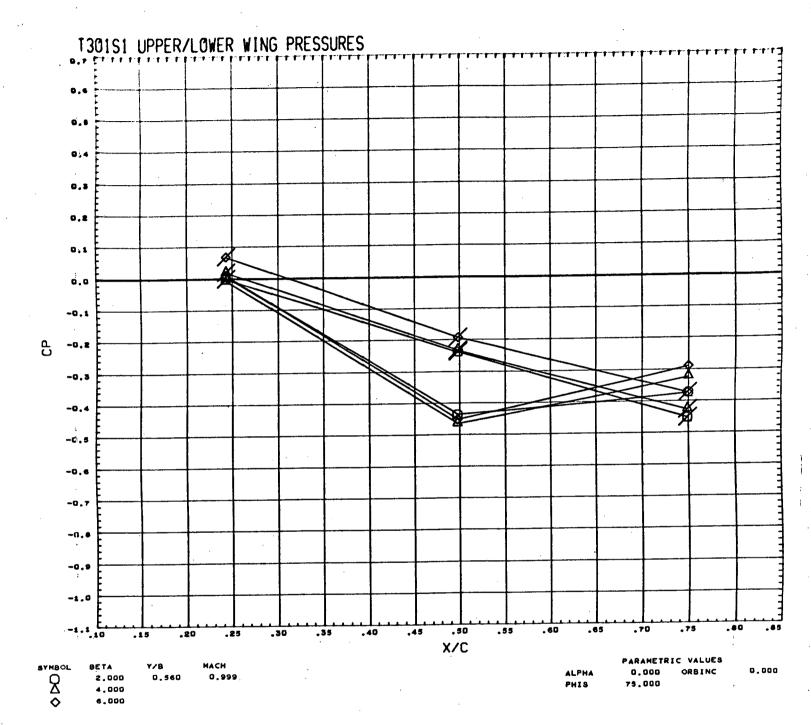






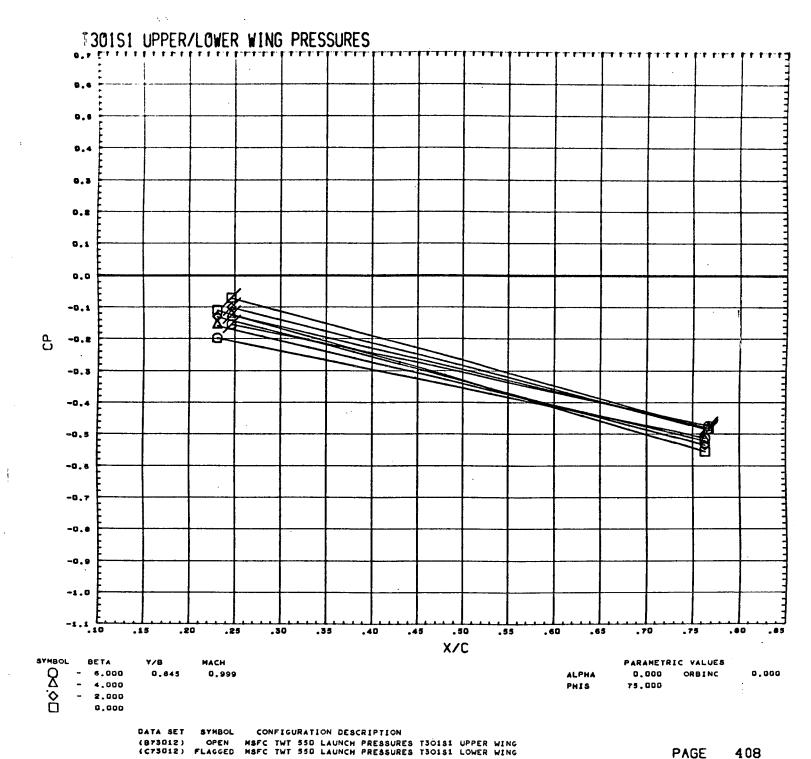


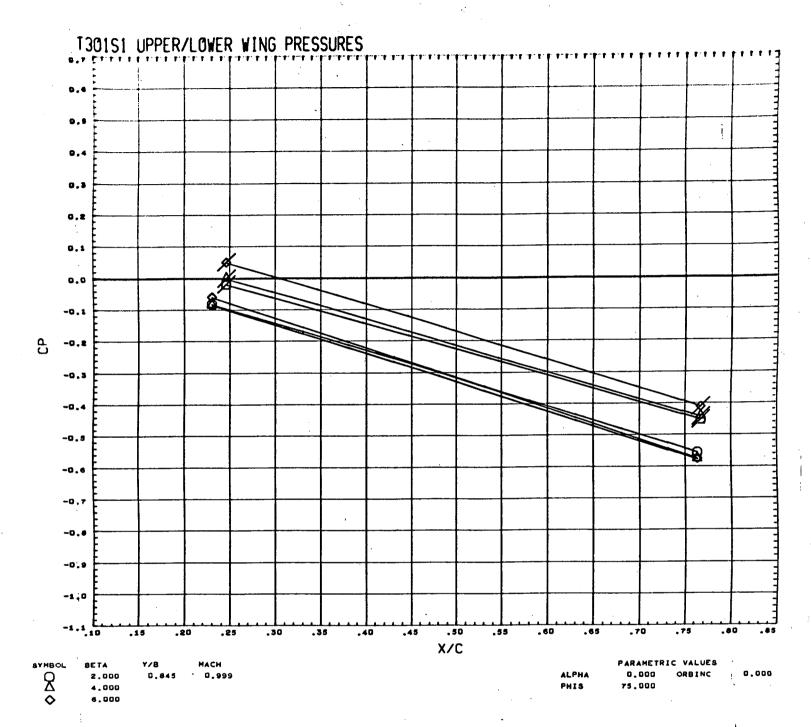


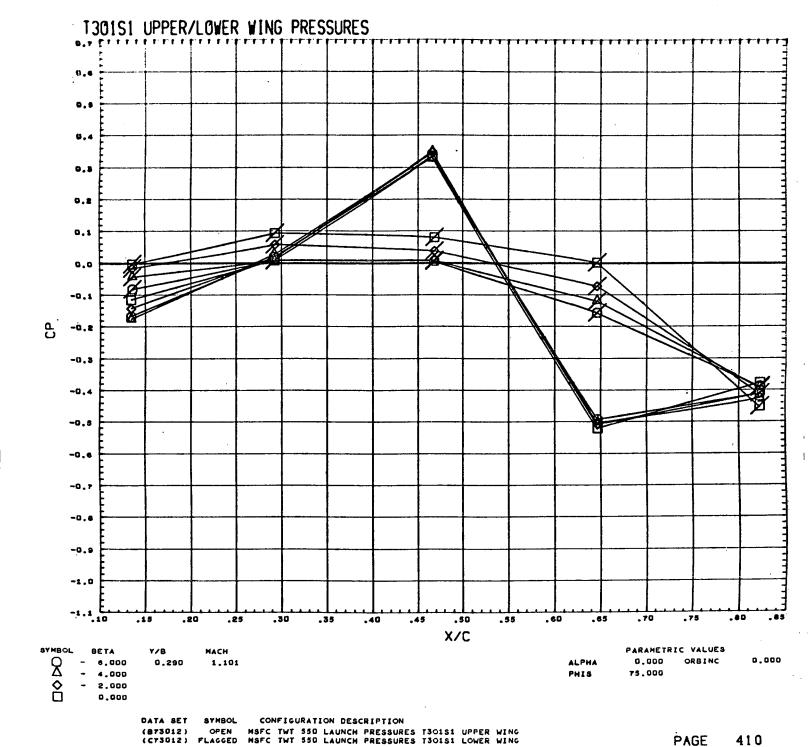


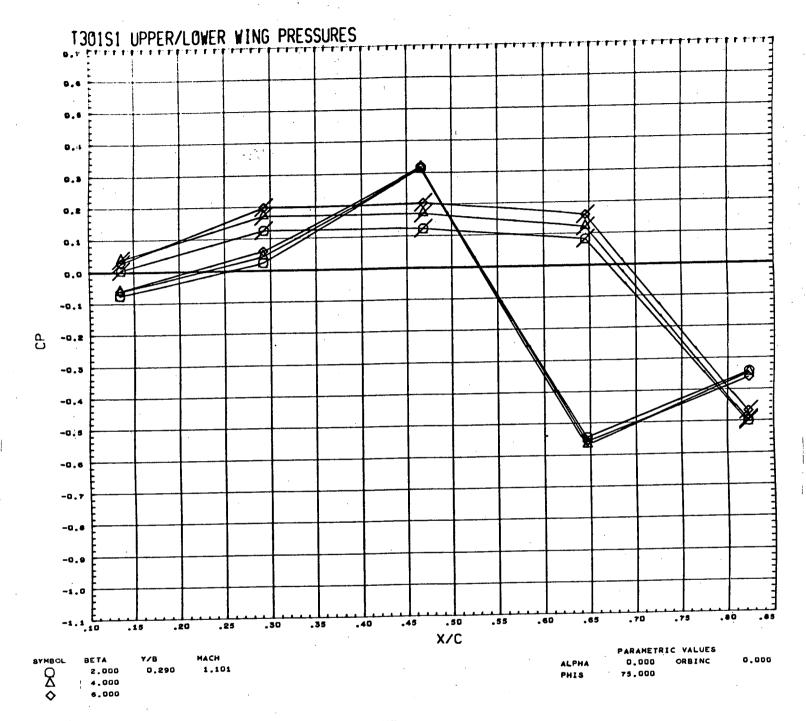
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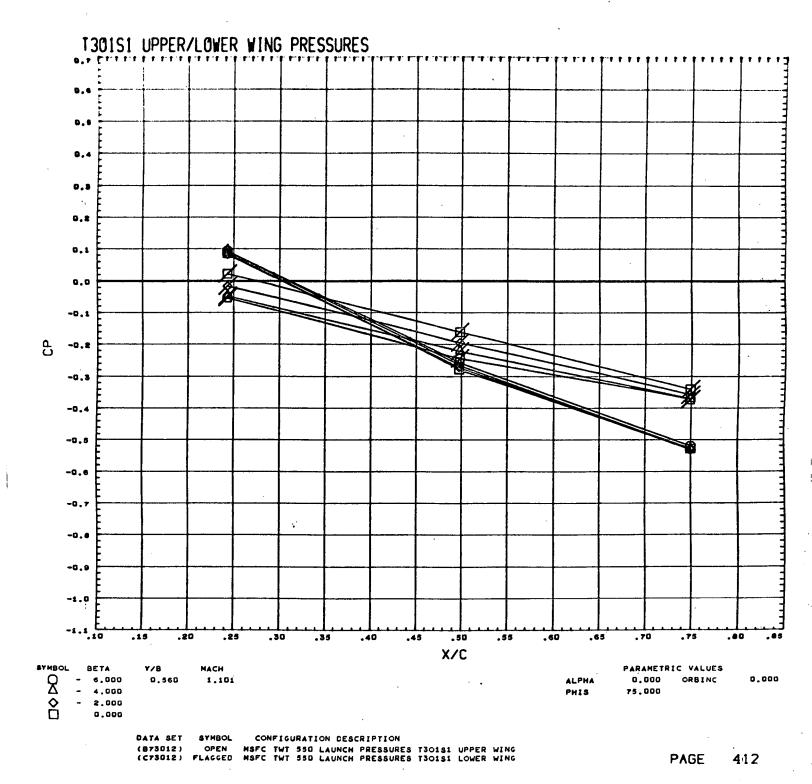
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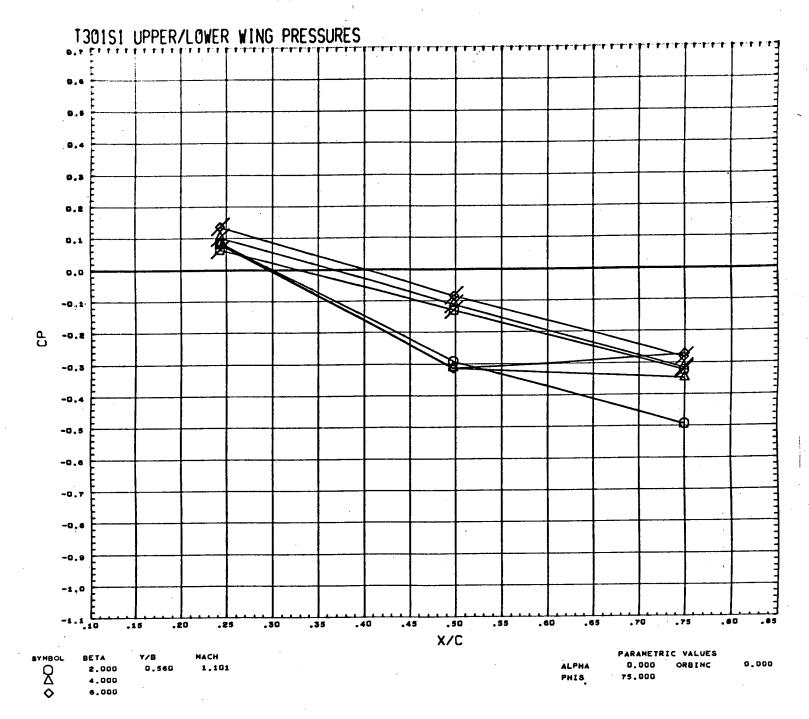


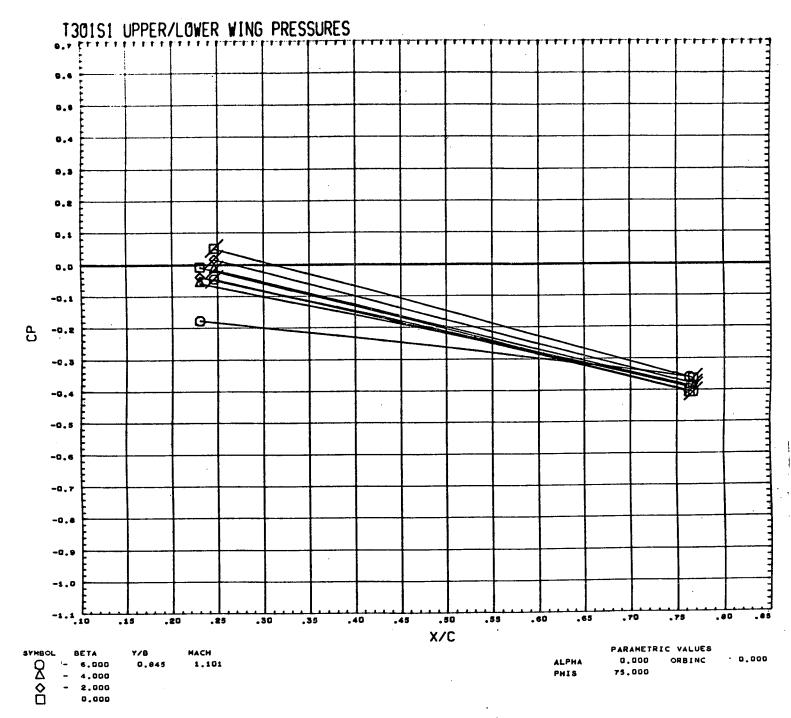


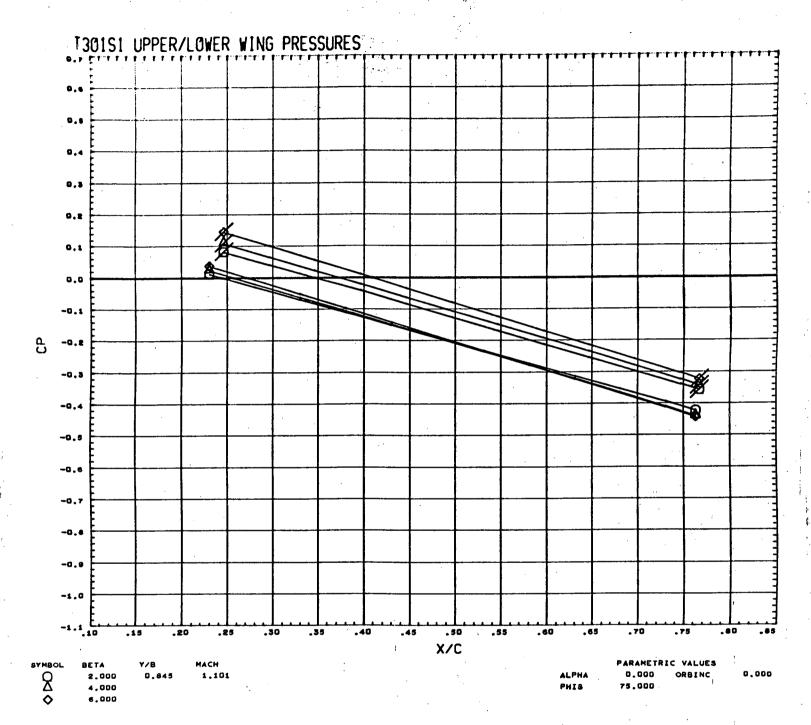


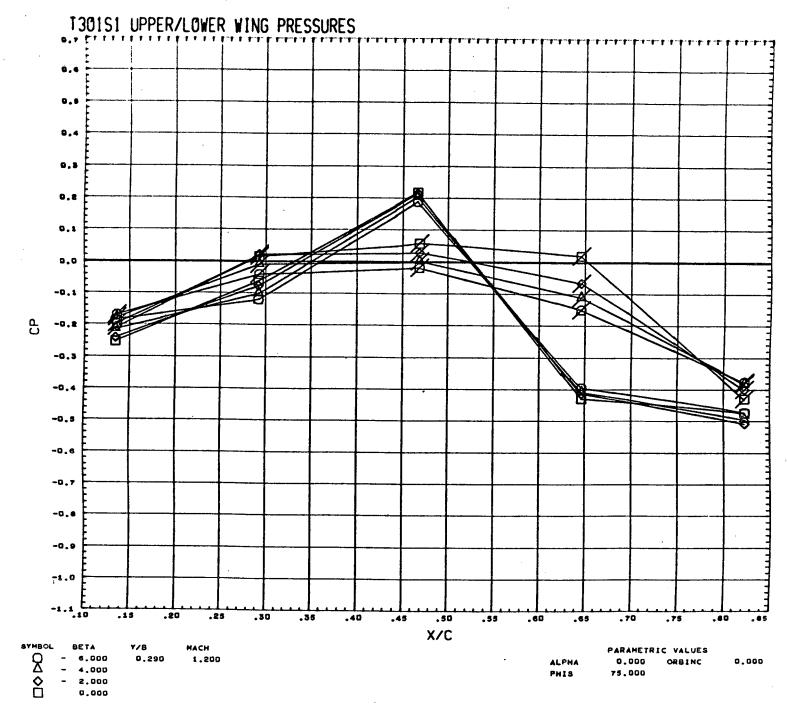


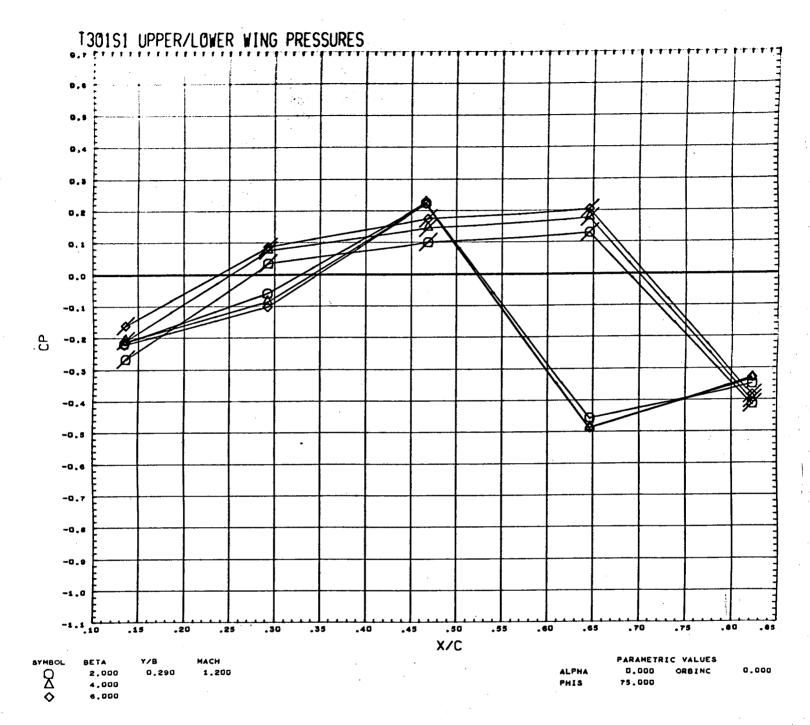
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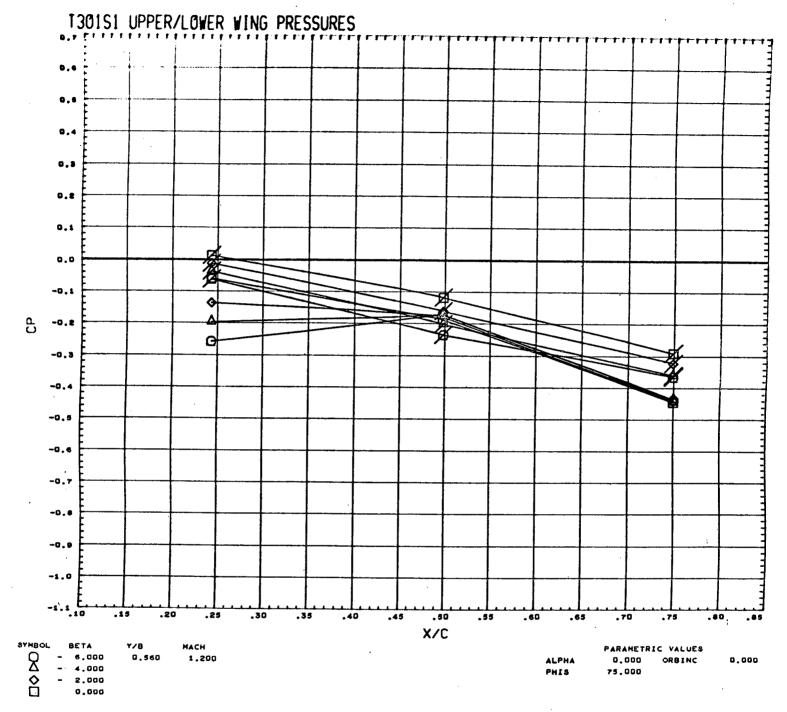


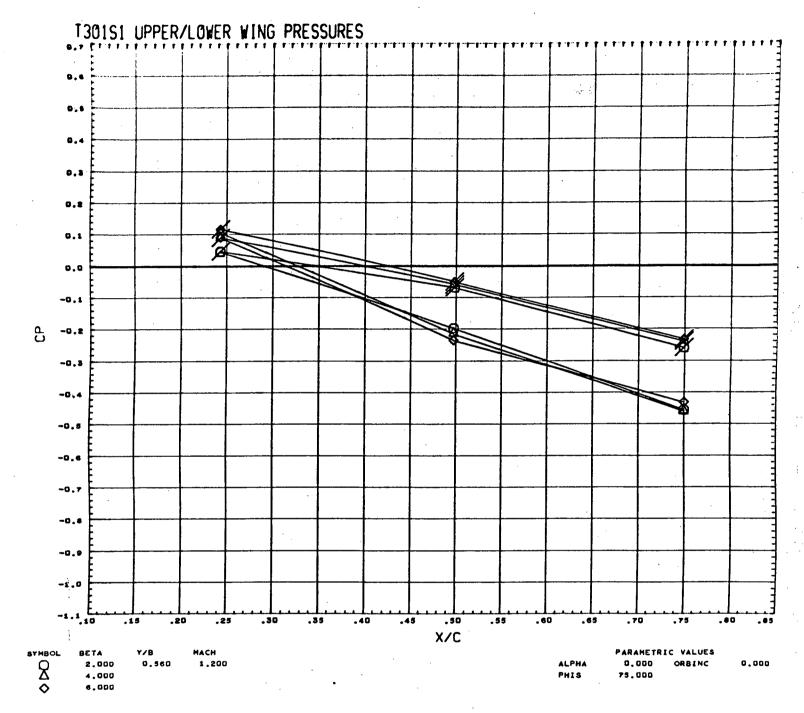


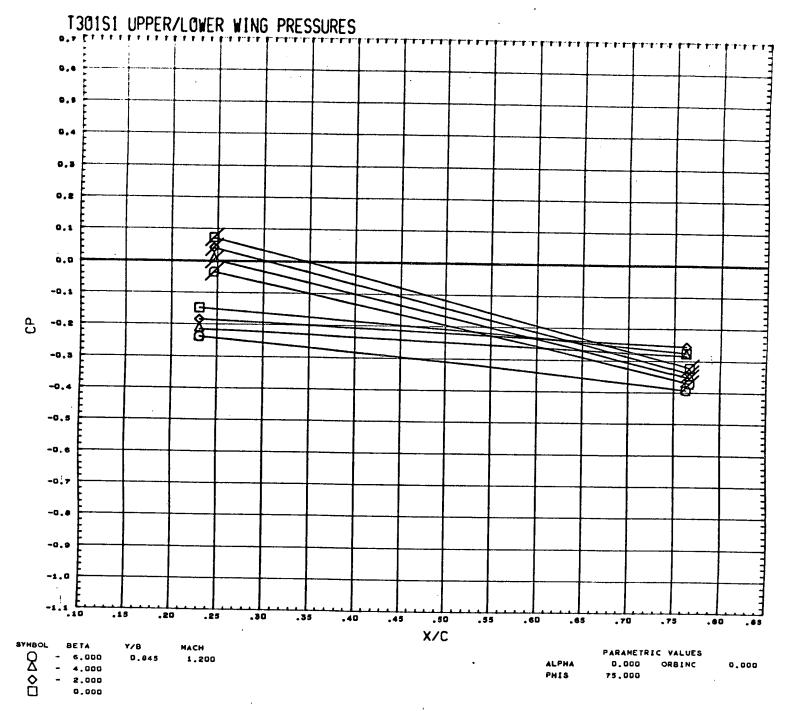


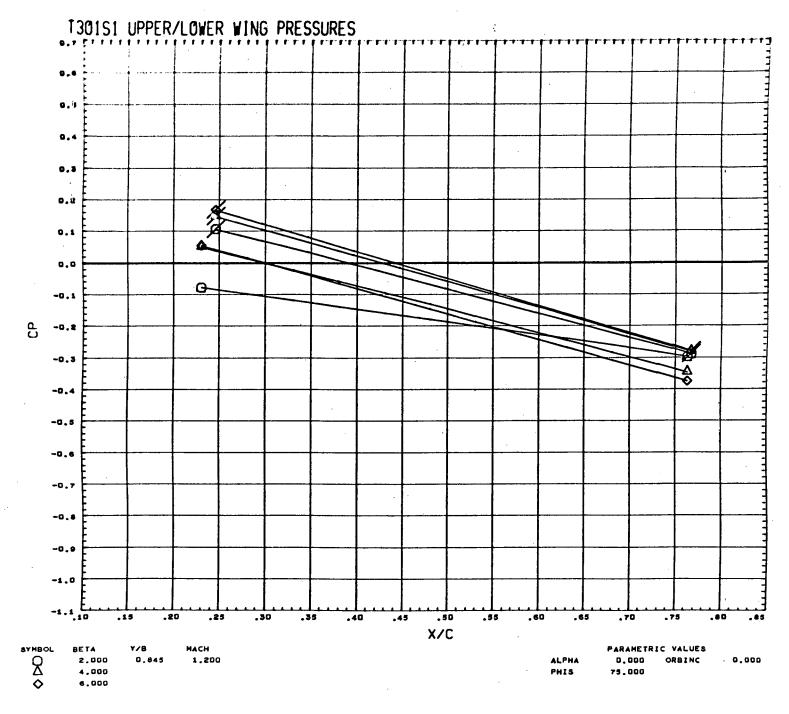


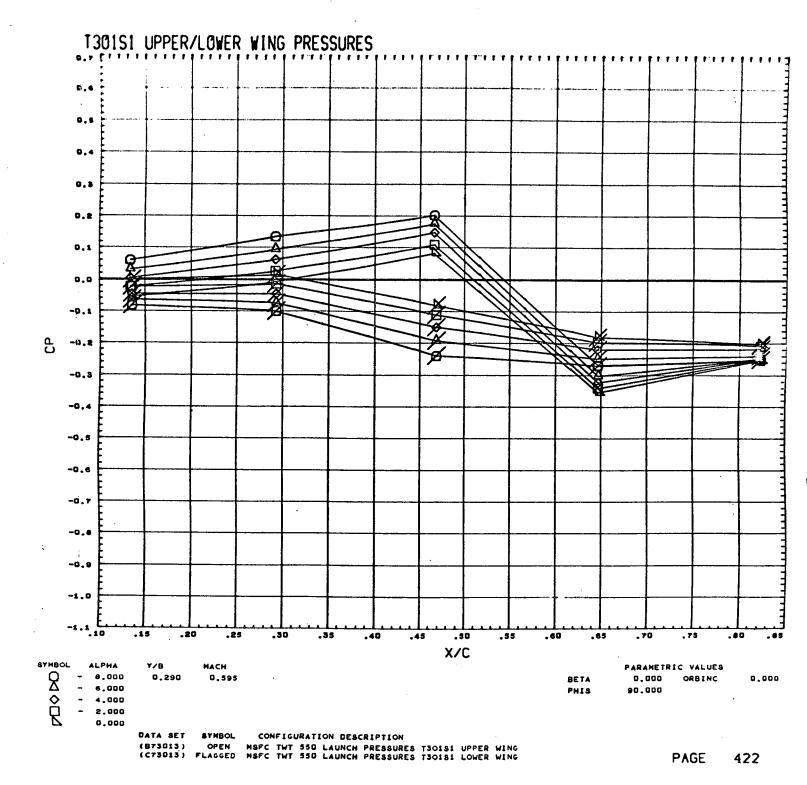


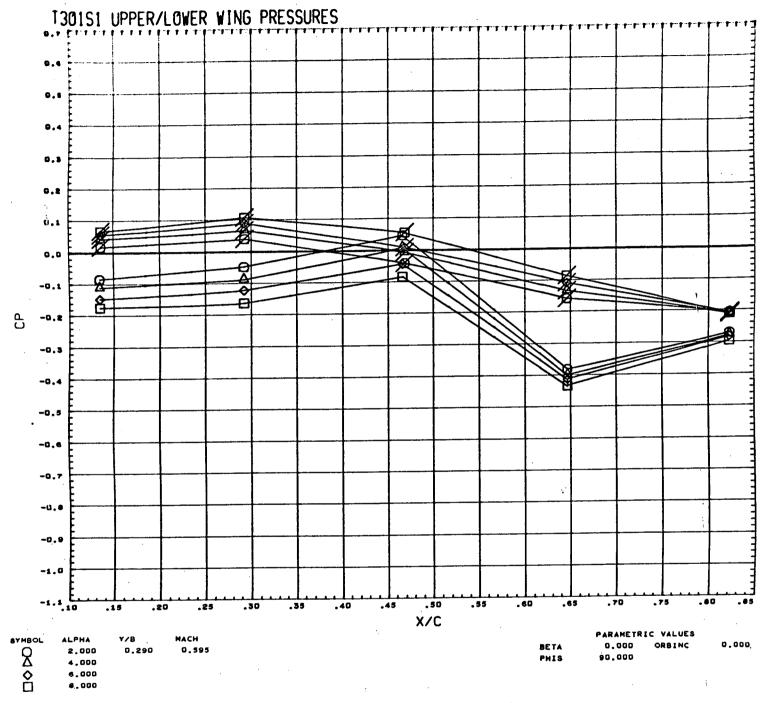






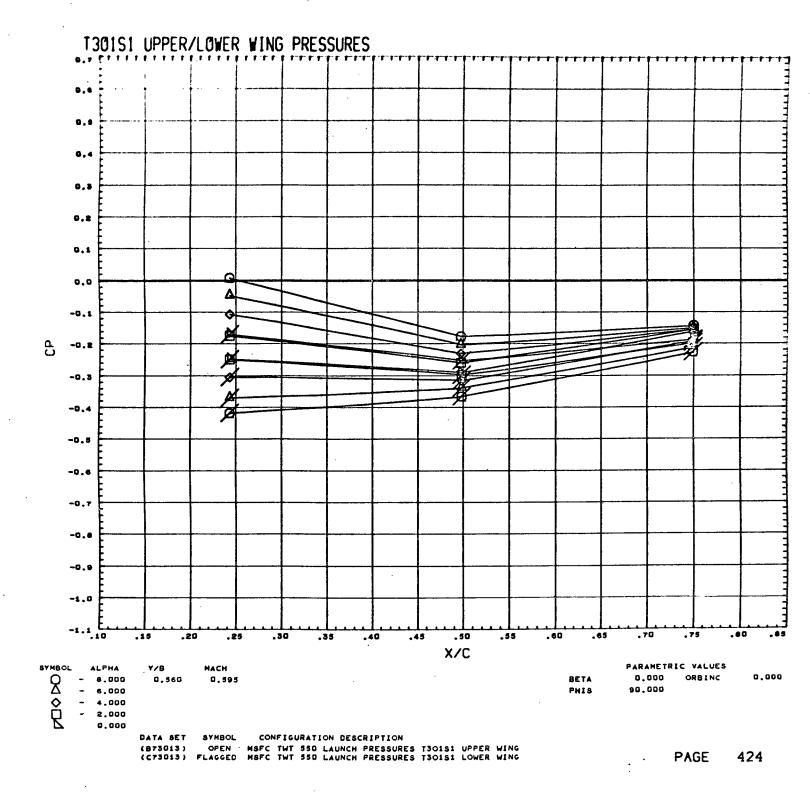


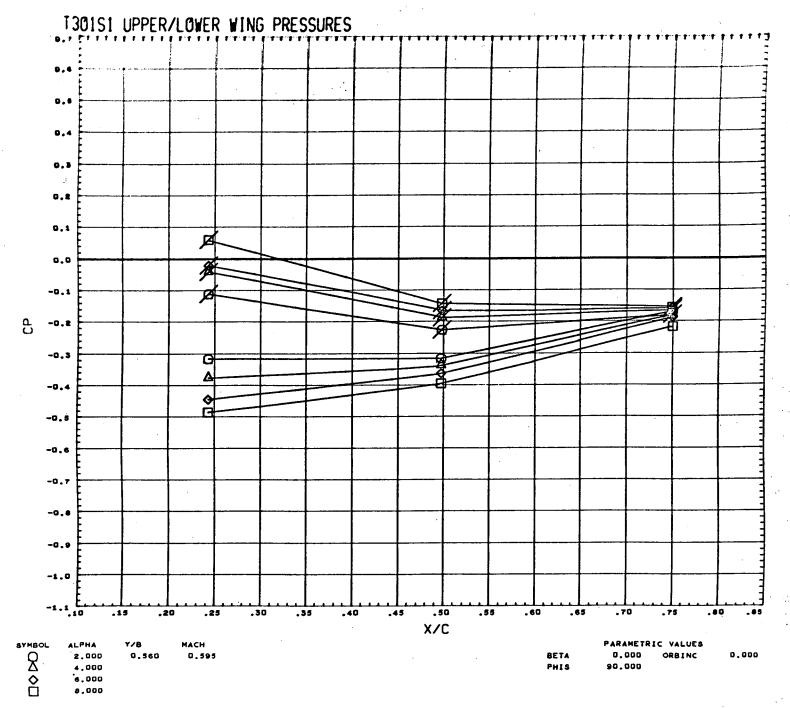


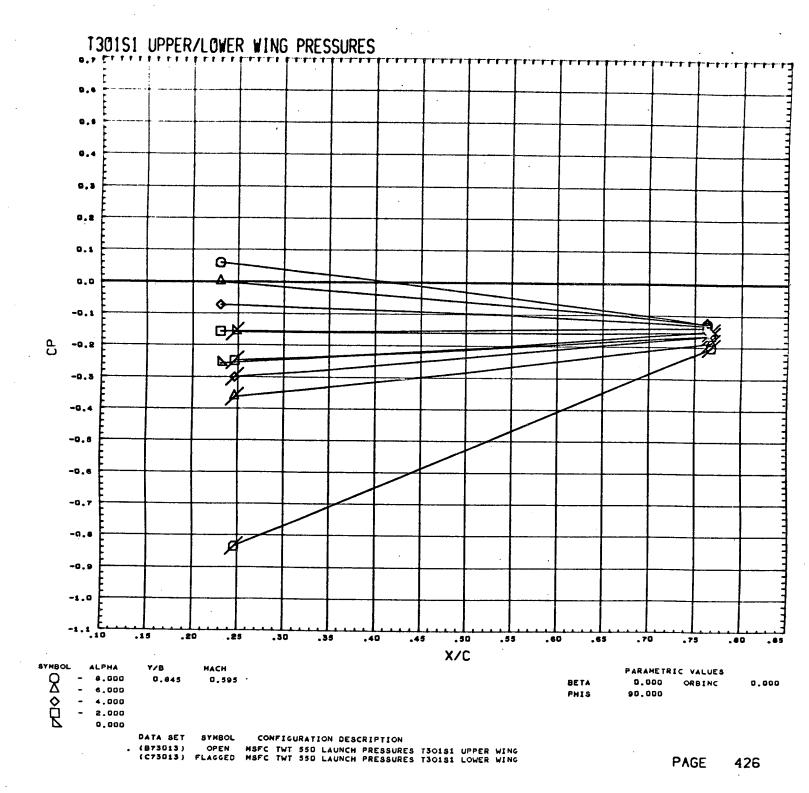


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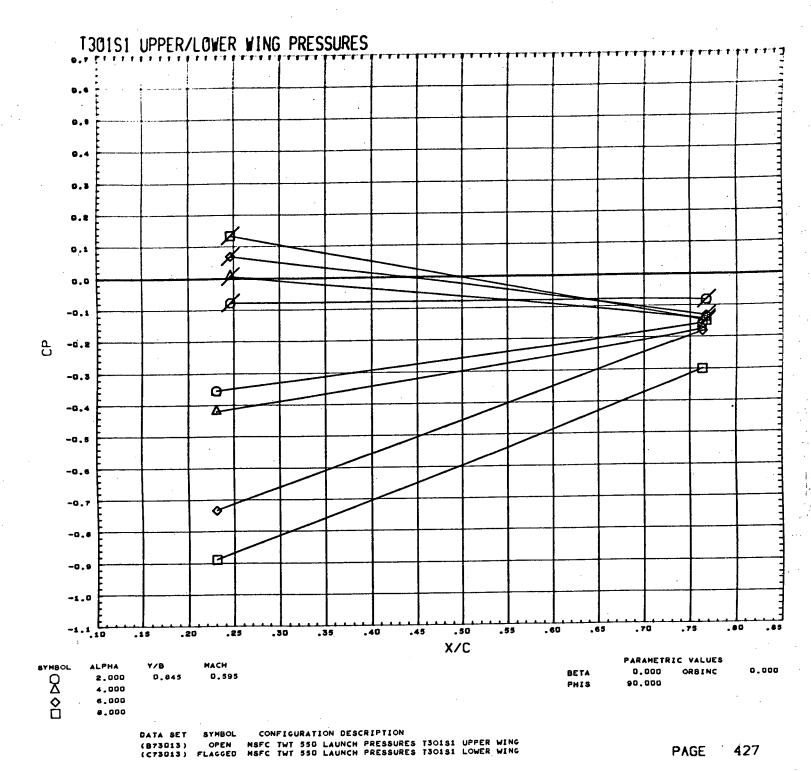
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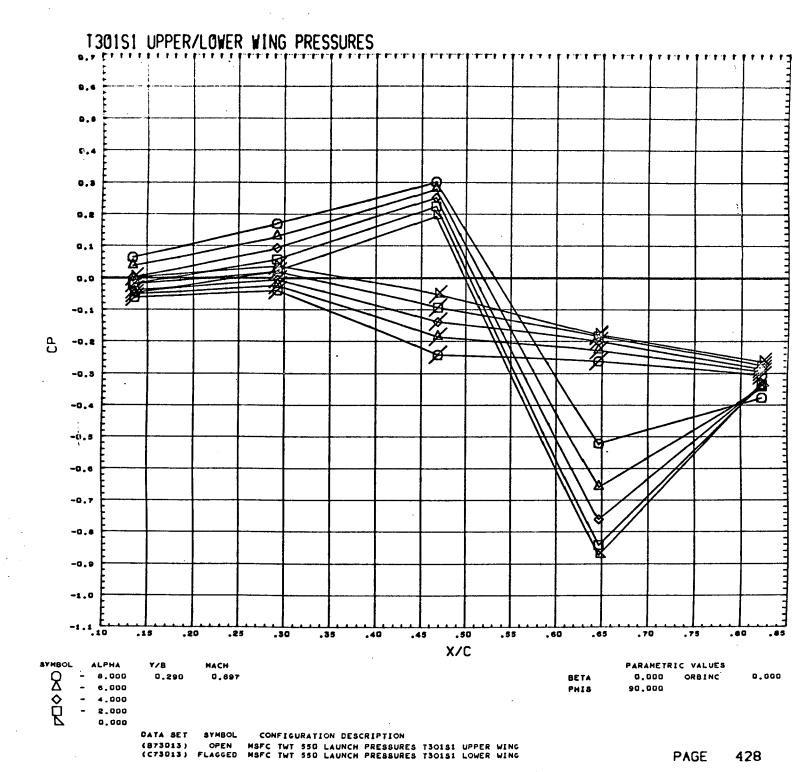


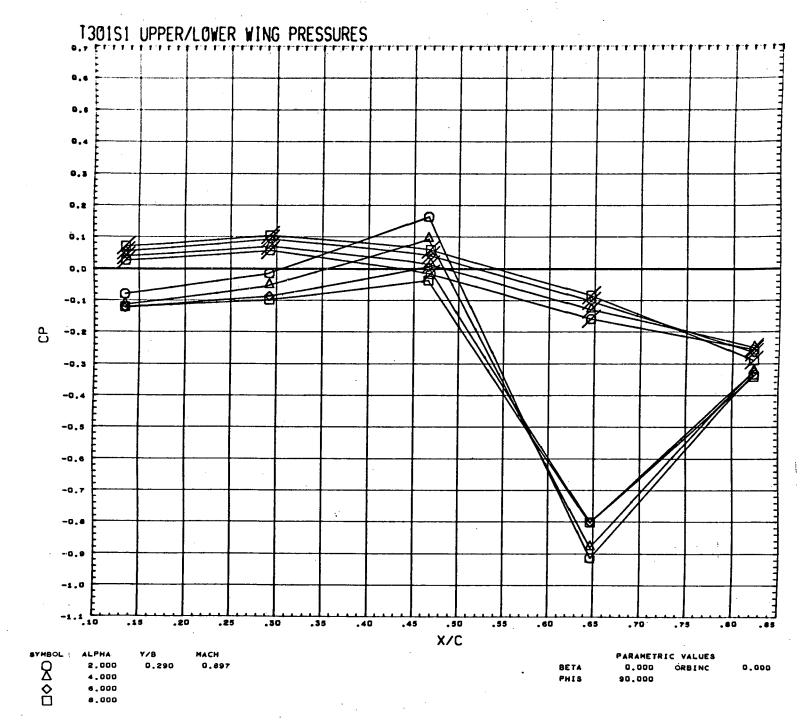


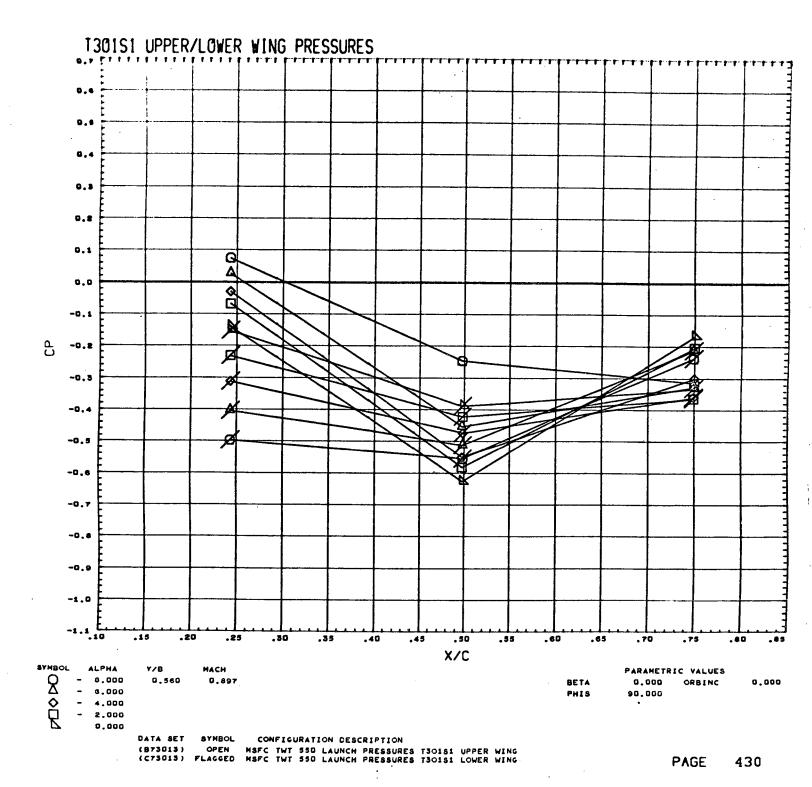


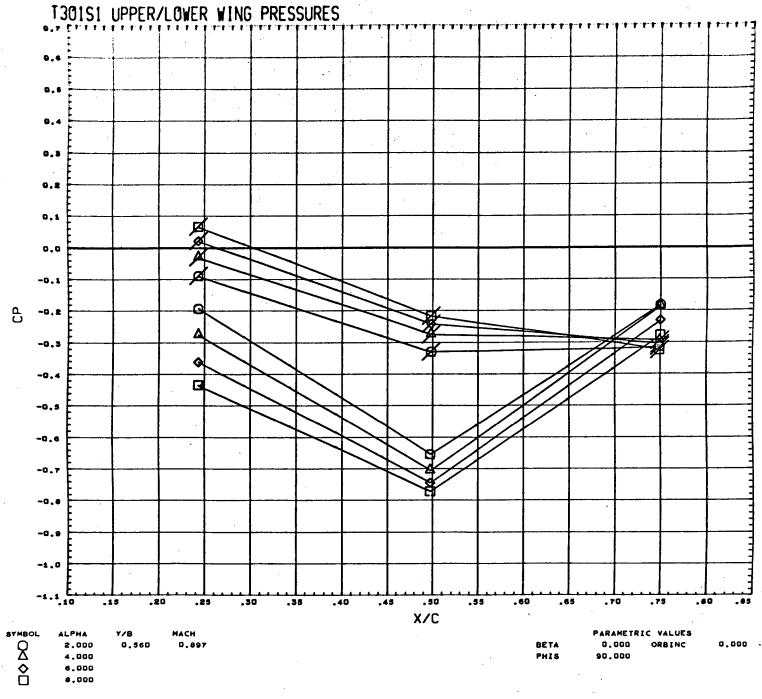
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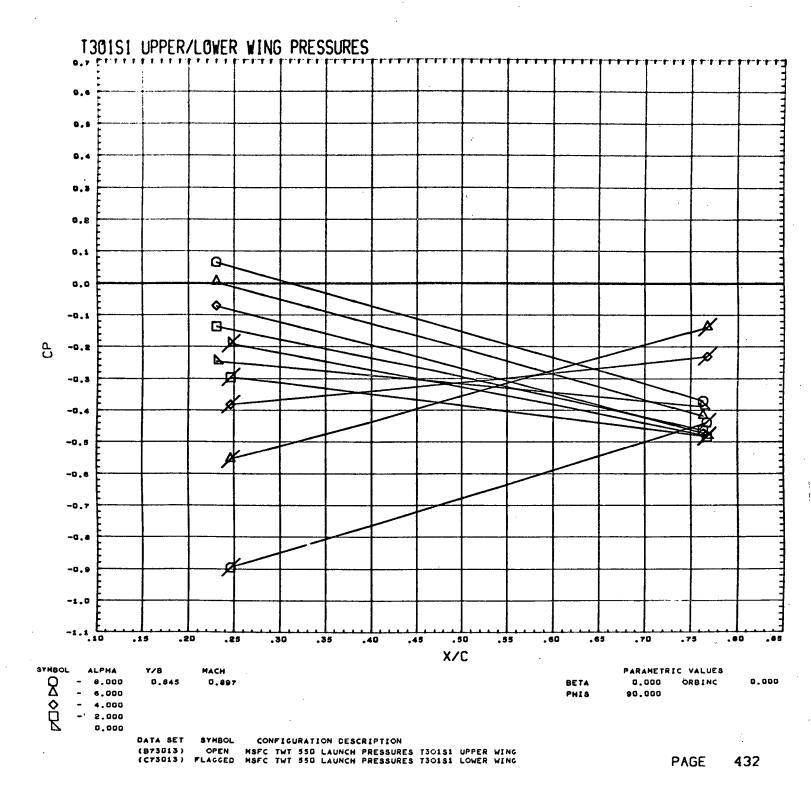


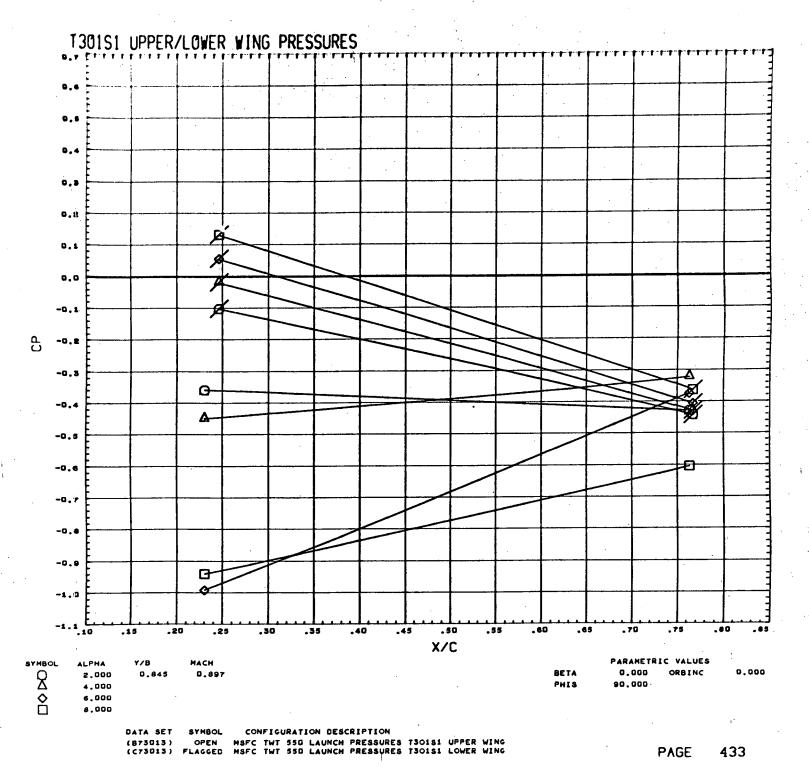


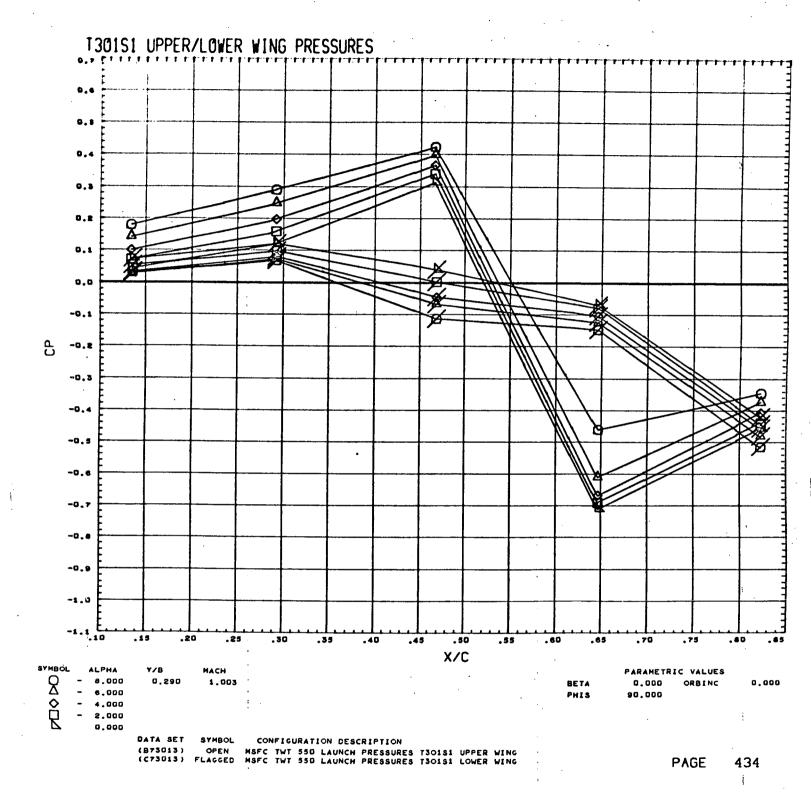


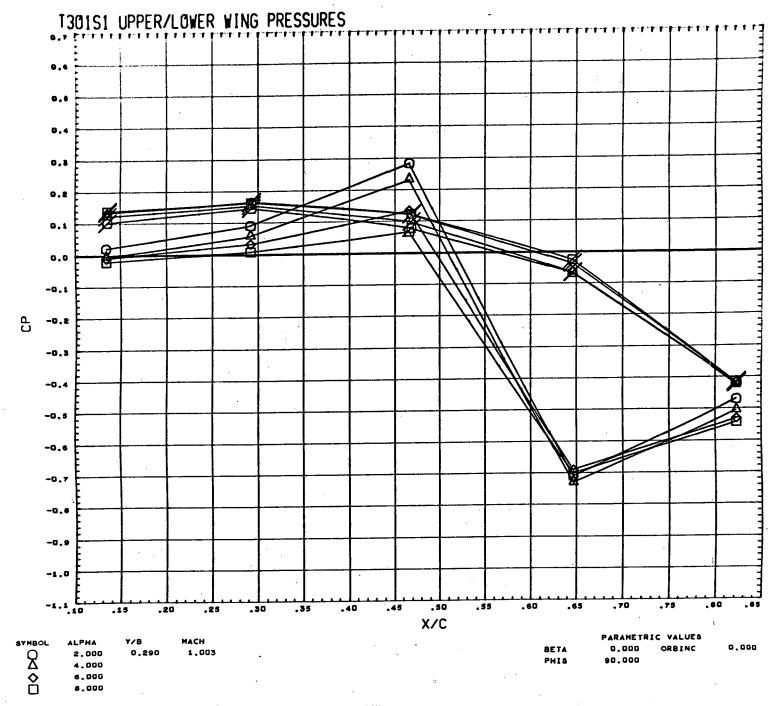


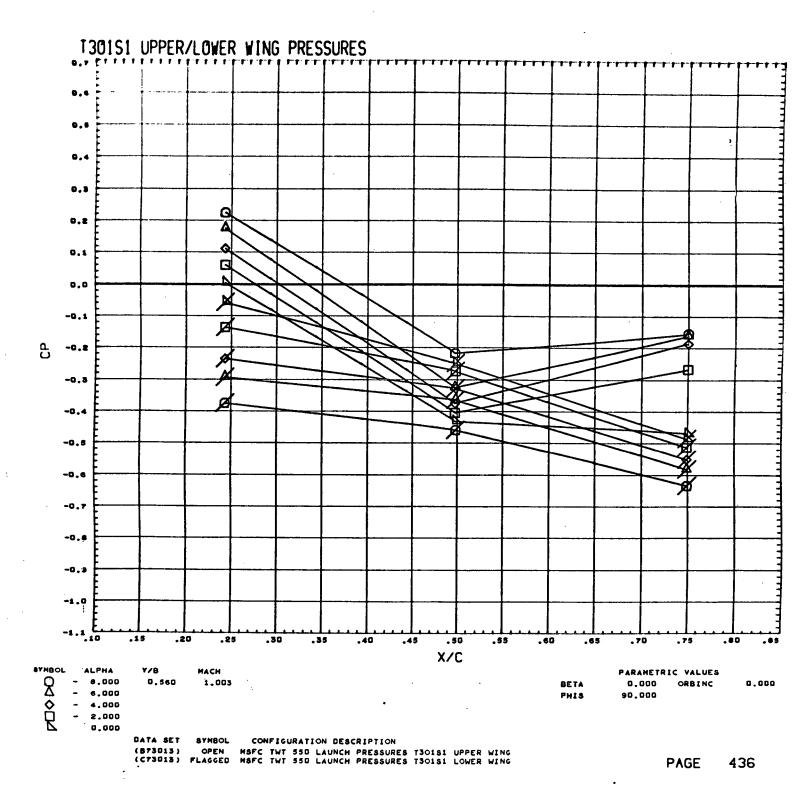


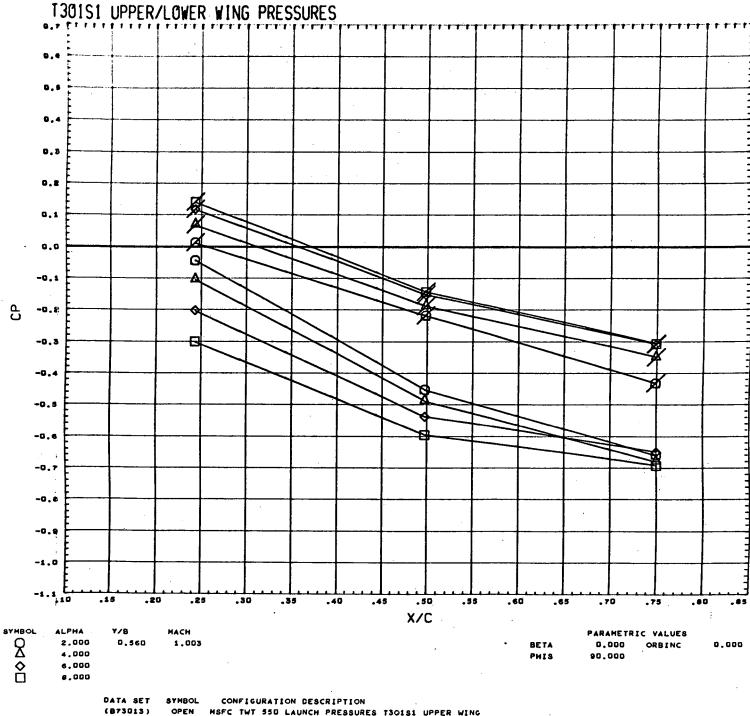




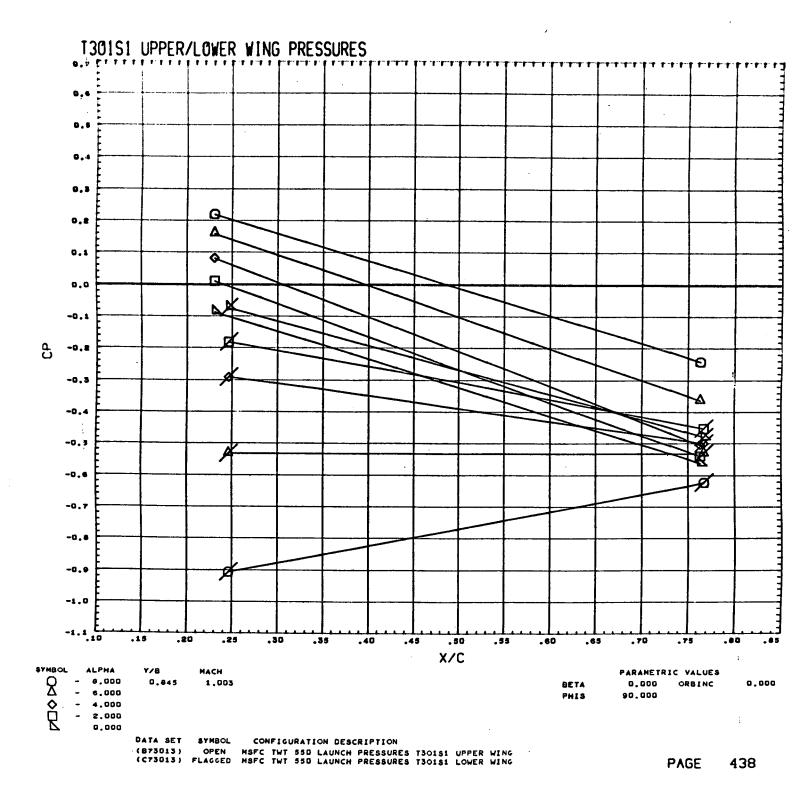


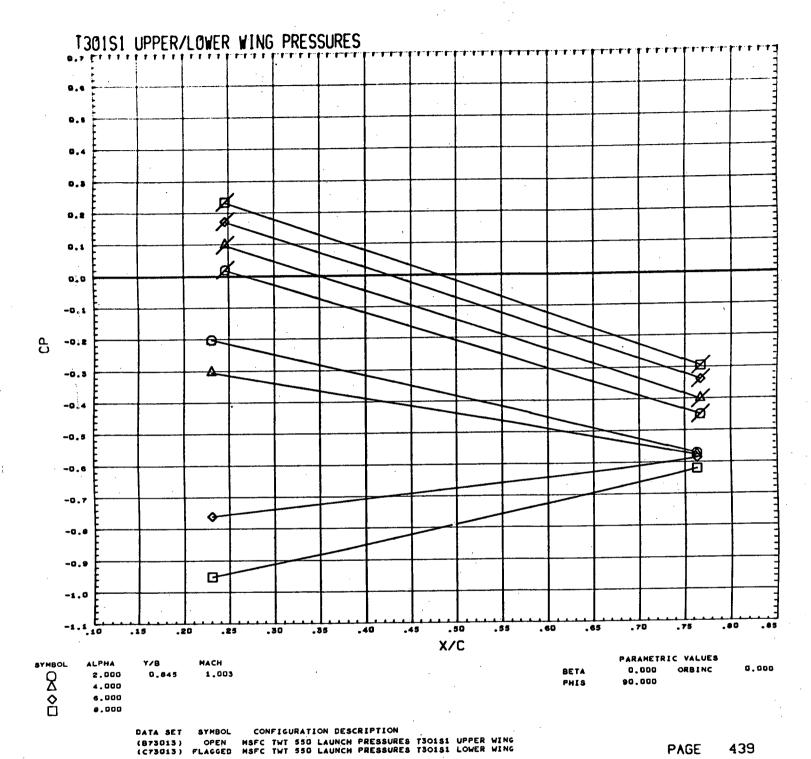


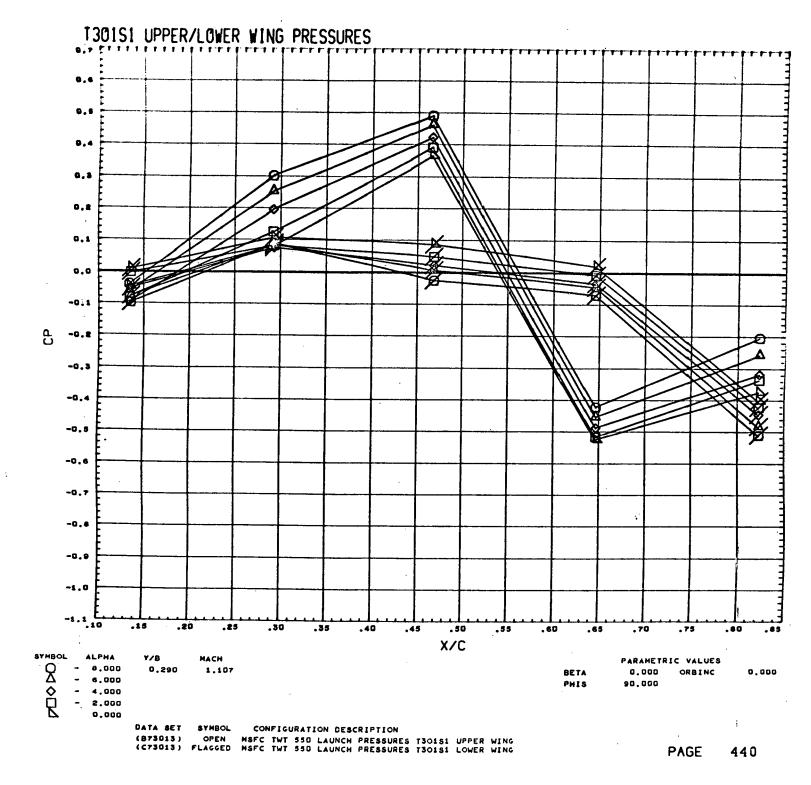


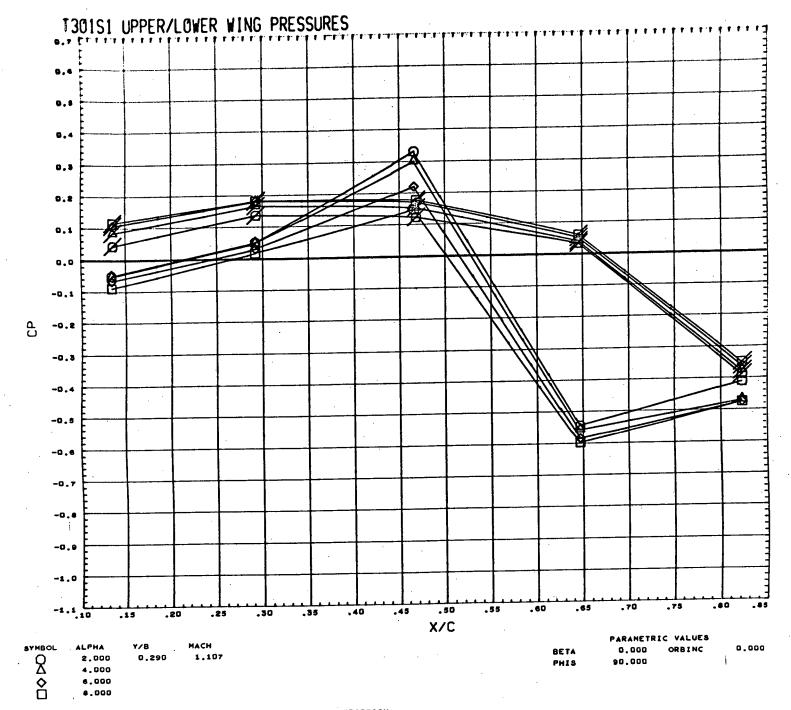


(873013) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73013) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING





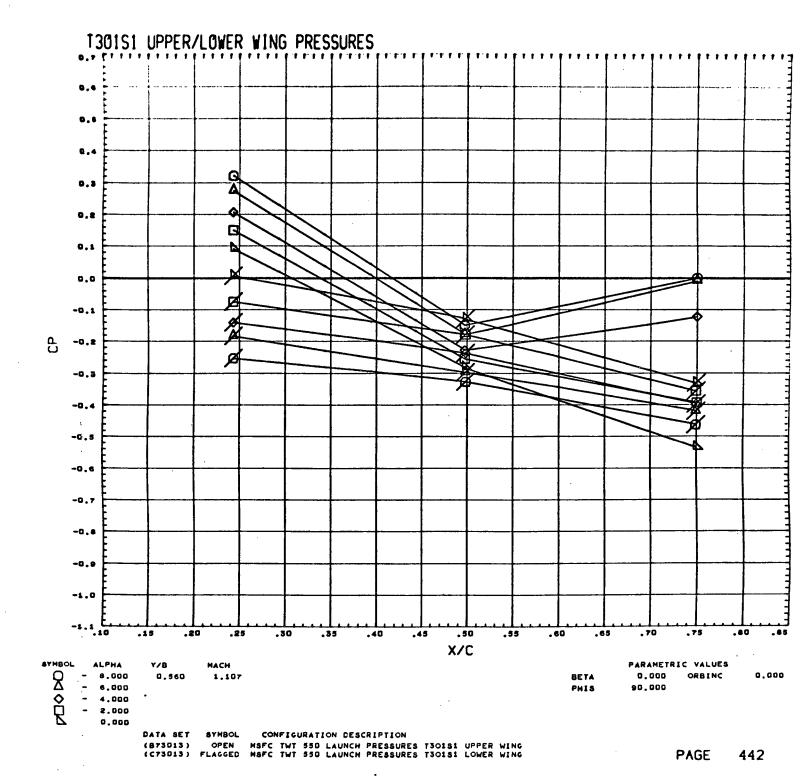


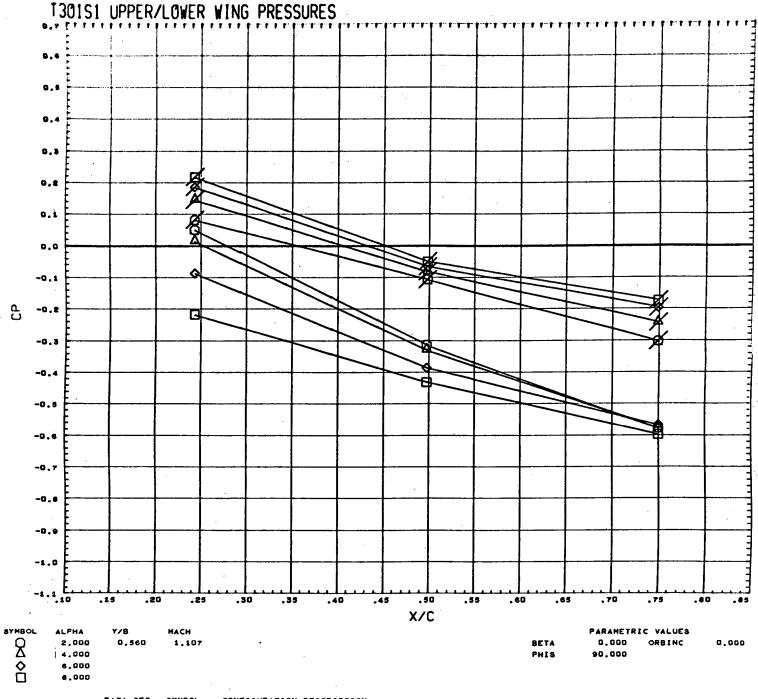


DATA SET SYMBOL CONFIGURATION DESCRIPTION

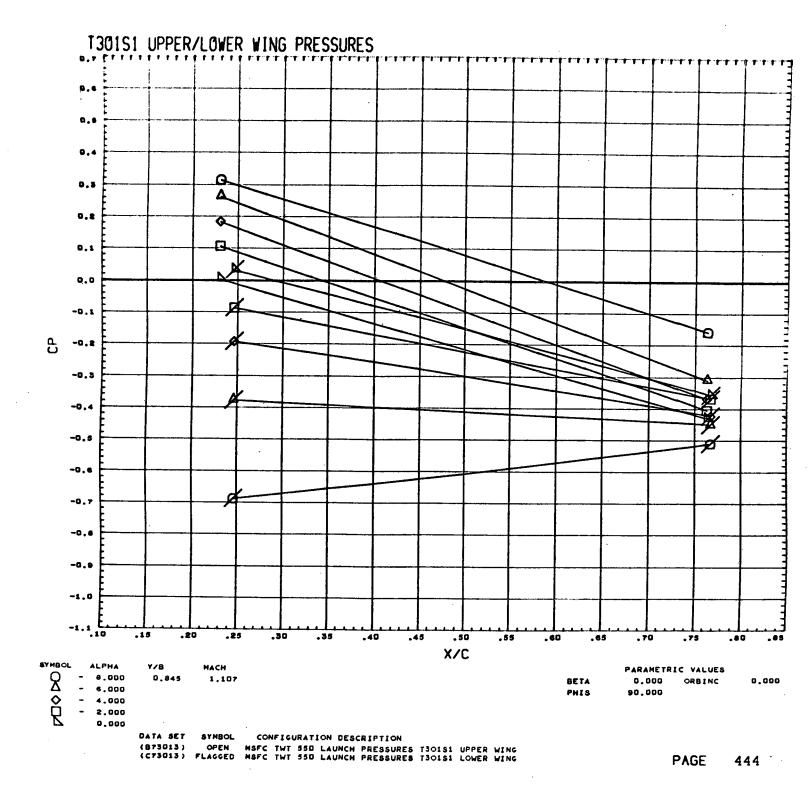
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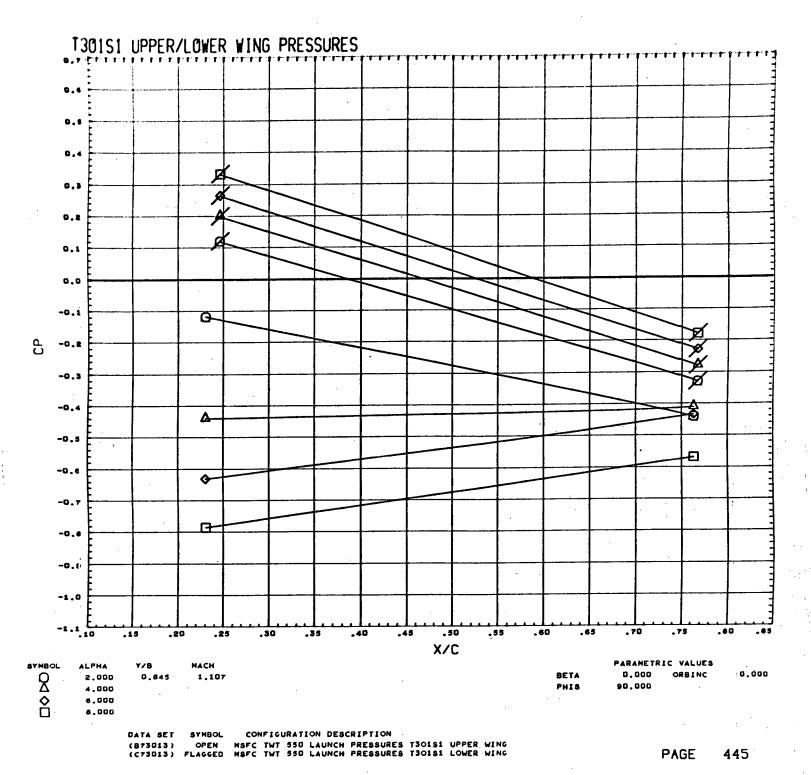
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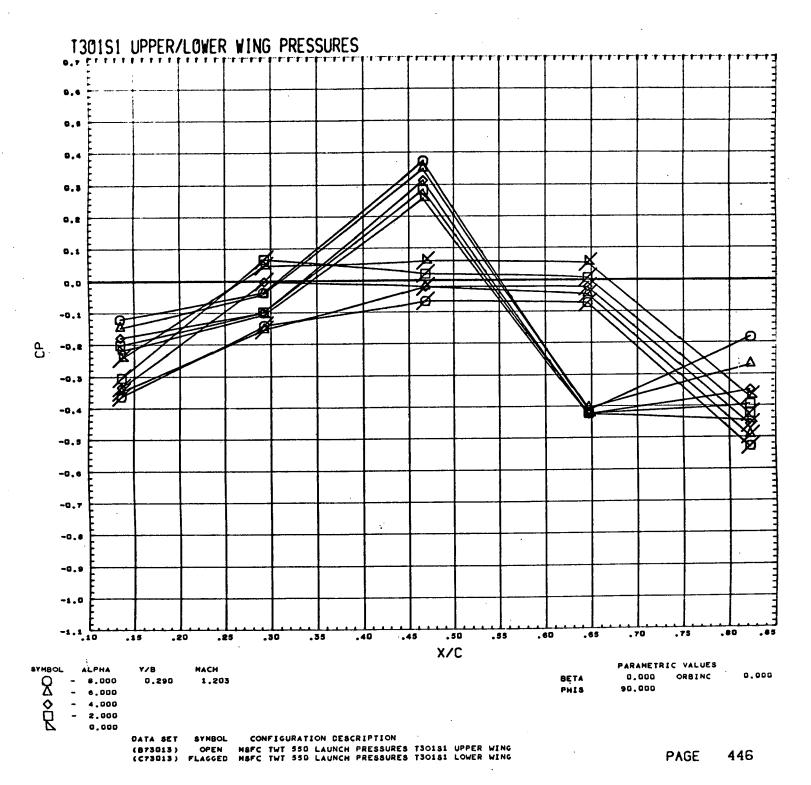


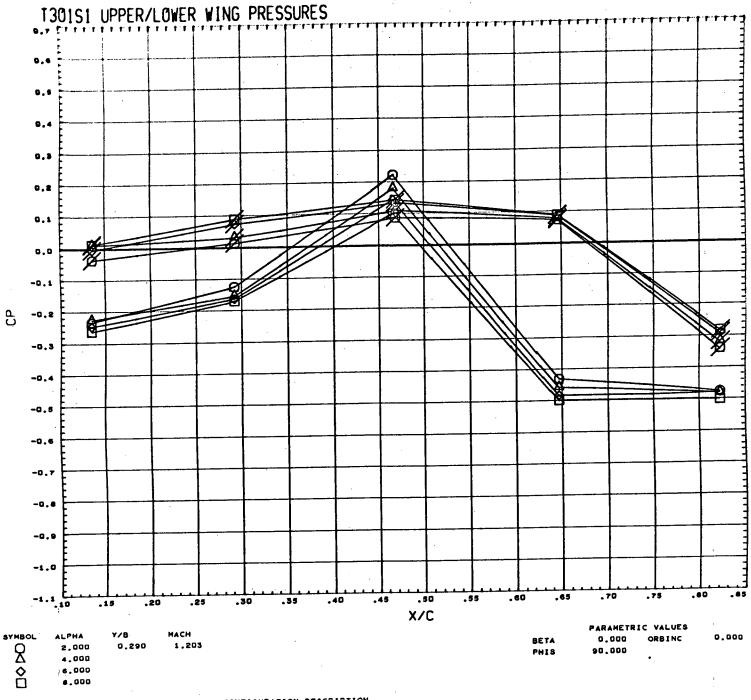


DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73013) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING





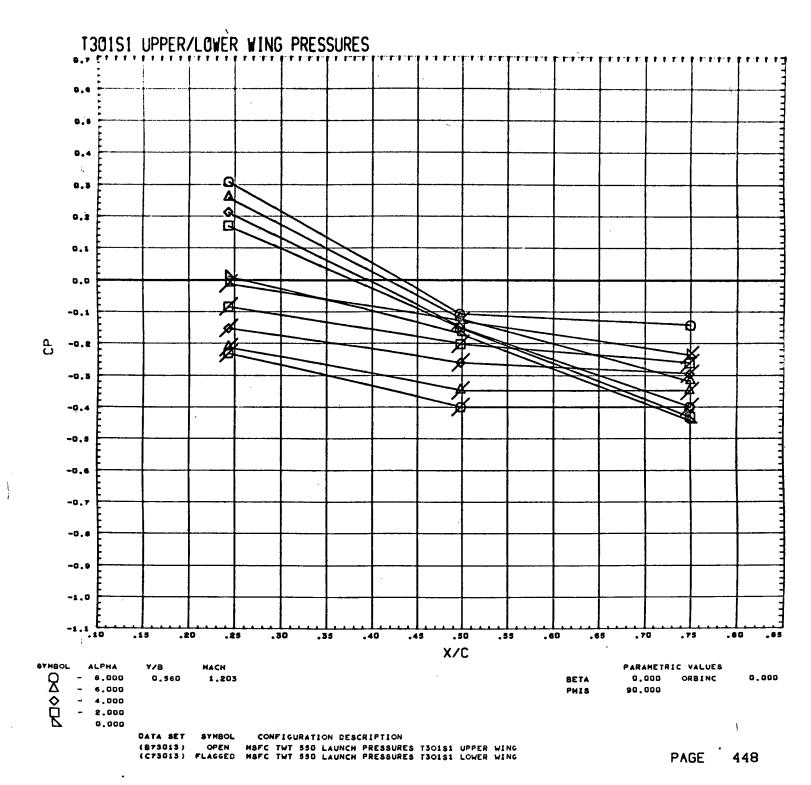


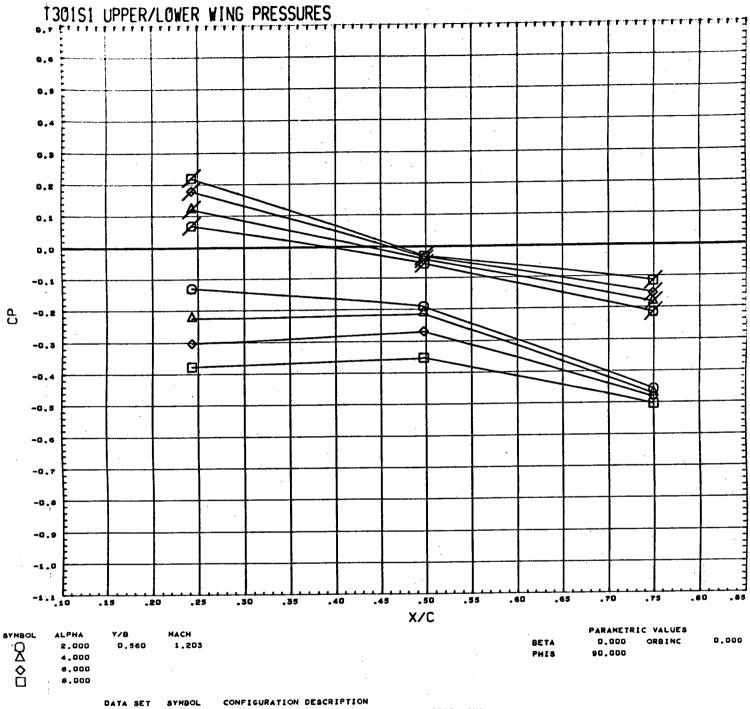


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73013) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

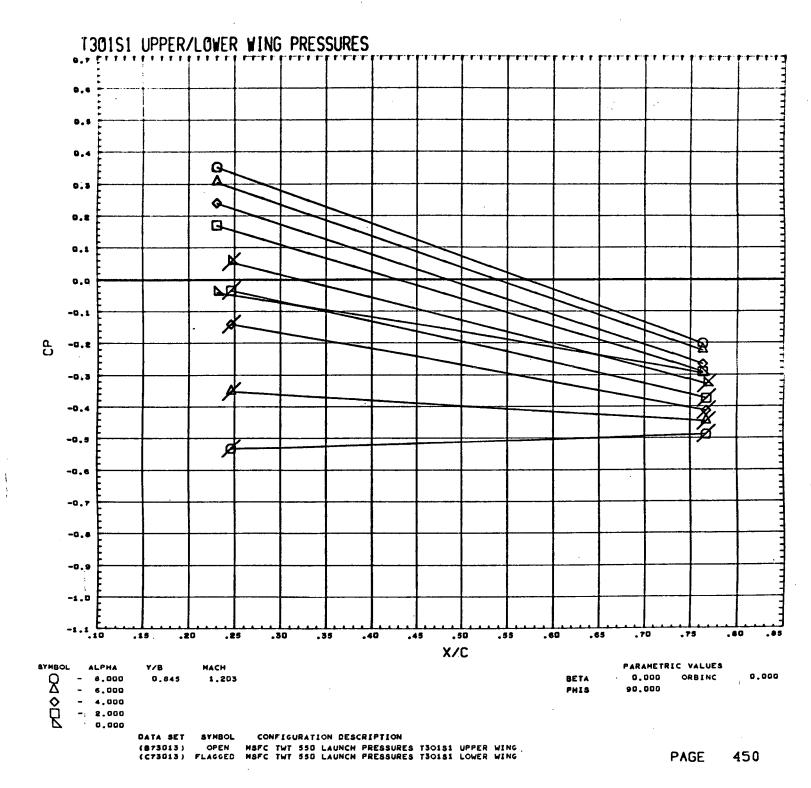


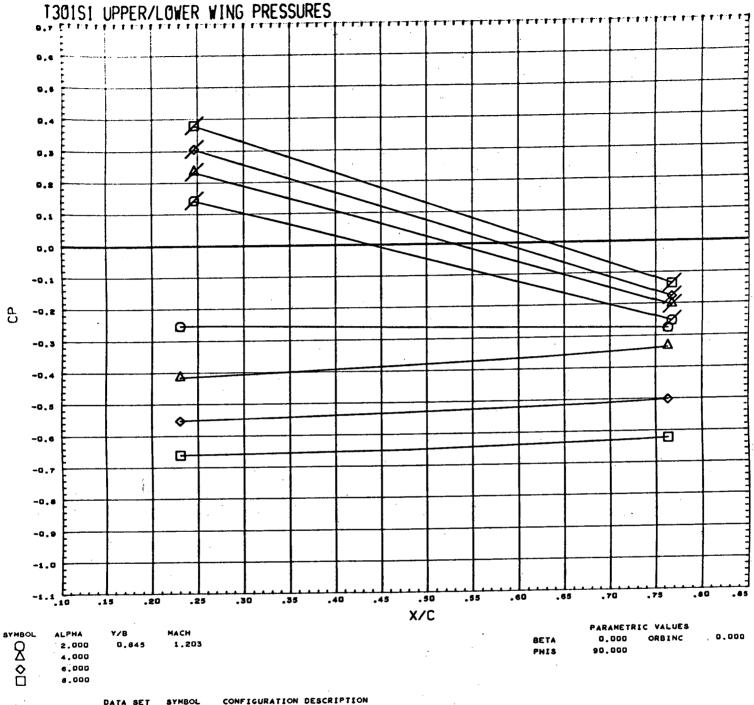


CONFIGURATION DESCRIPTION

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(C73013) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

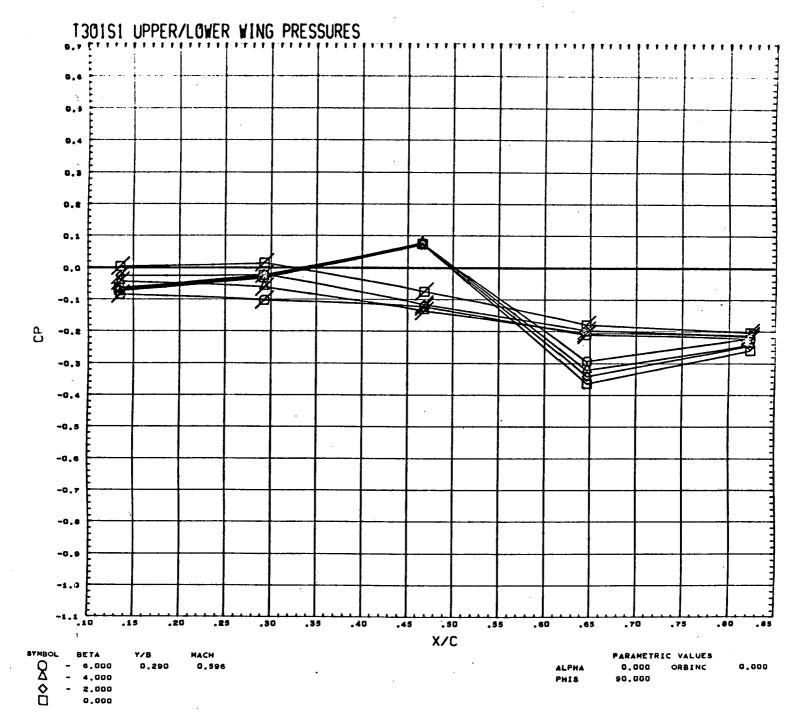




DATA SET SYMBOL CONFIGURATION DESCRIPTION

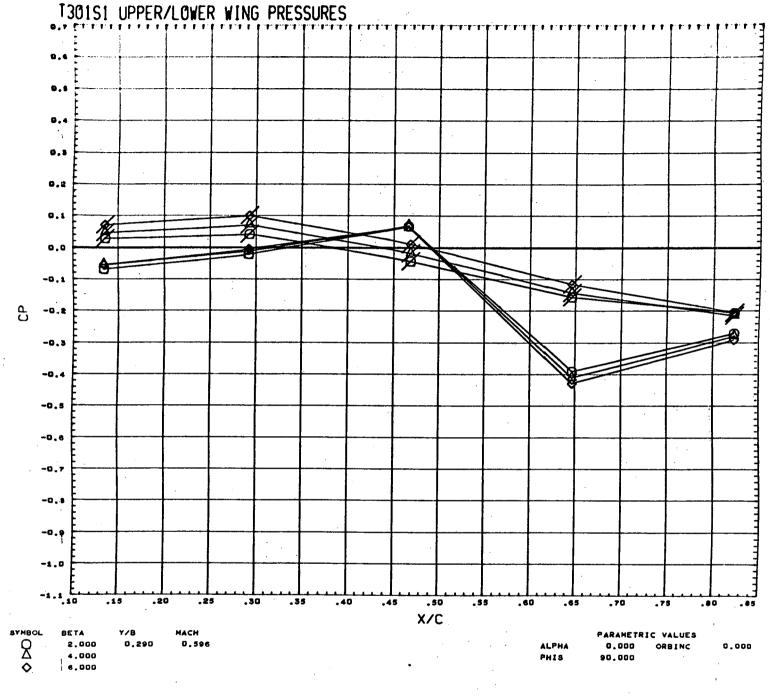
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(C73D13) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING



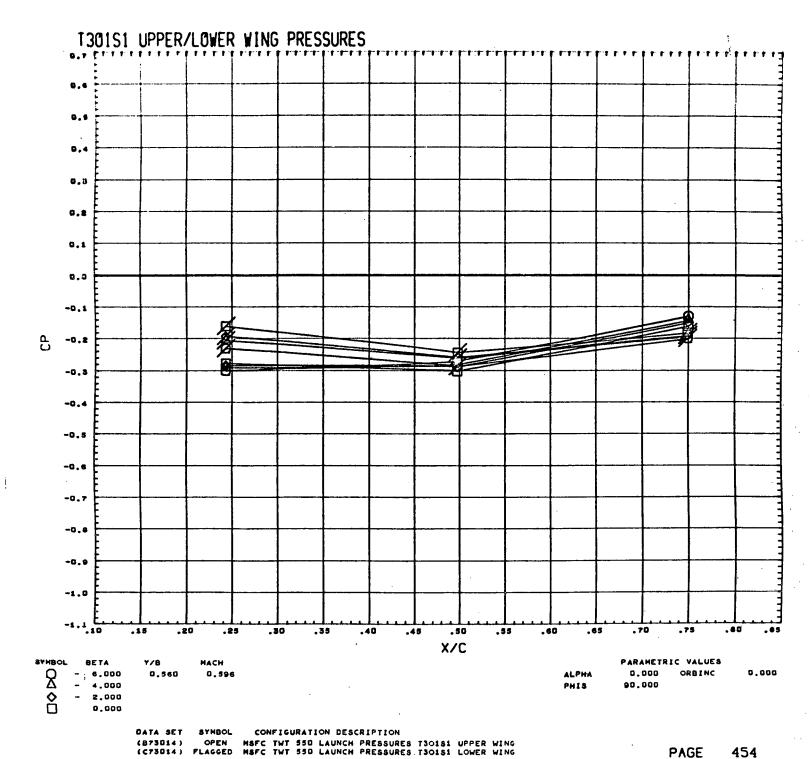
DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30151 LOWER WING



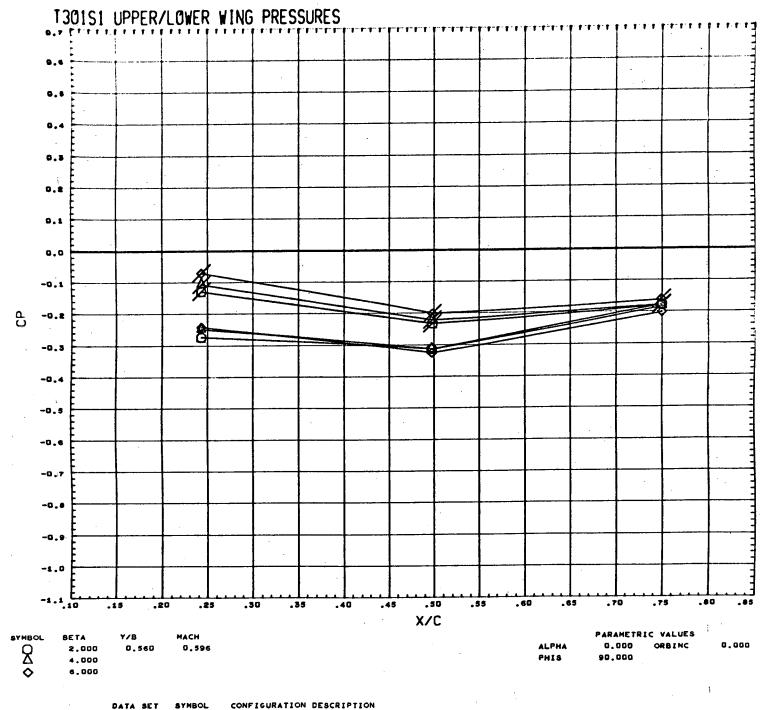
DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873014) OPEN MSFC TWT 550 LAUNCH PRESSURES 1301S1 UPPER WING
(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES 1301S1 LOWER WING



PAGE

454

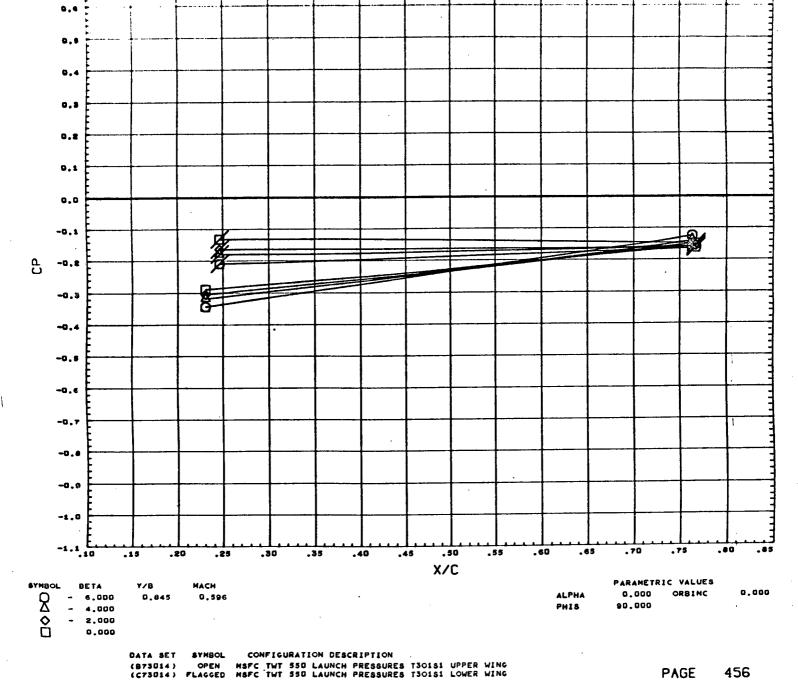


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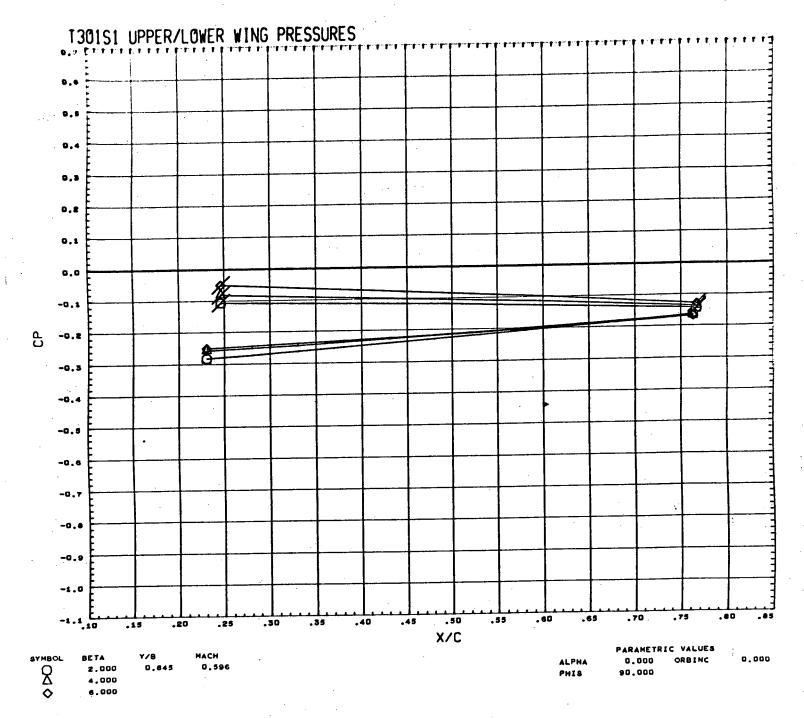
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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING





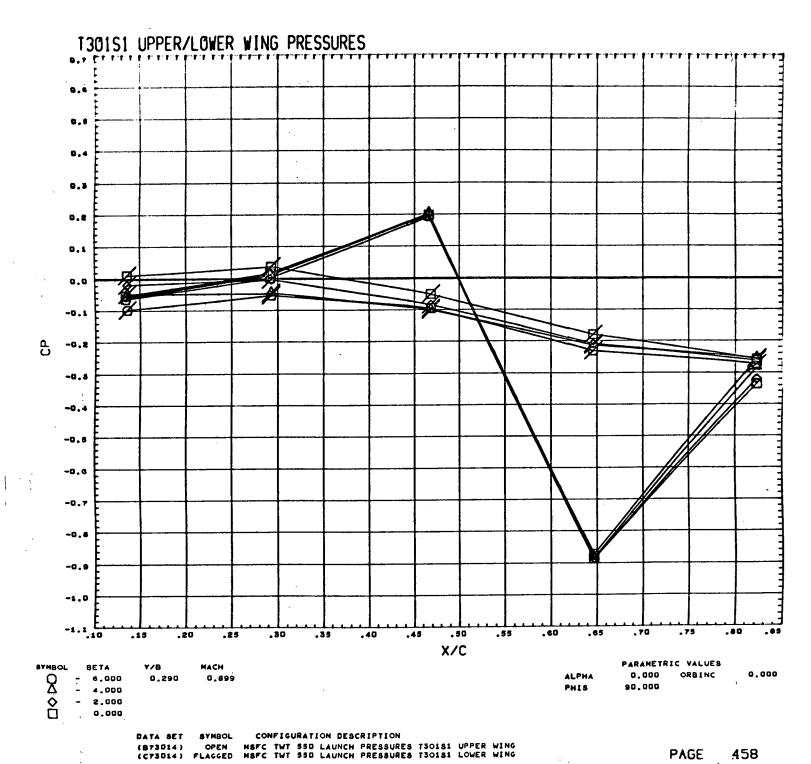
1301S1 UPPER/LOWER WING PRESSURES

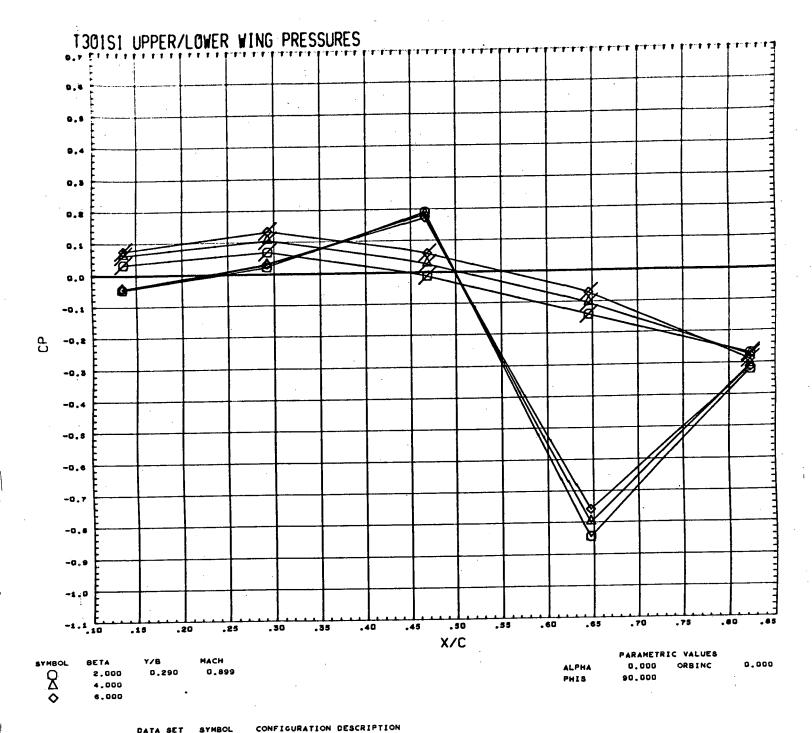


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

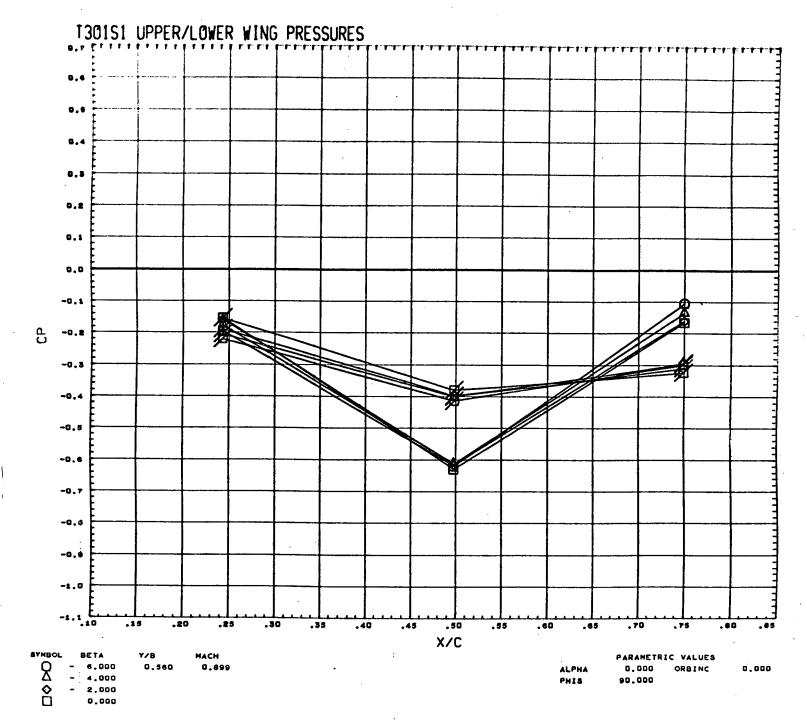




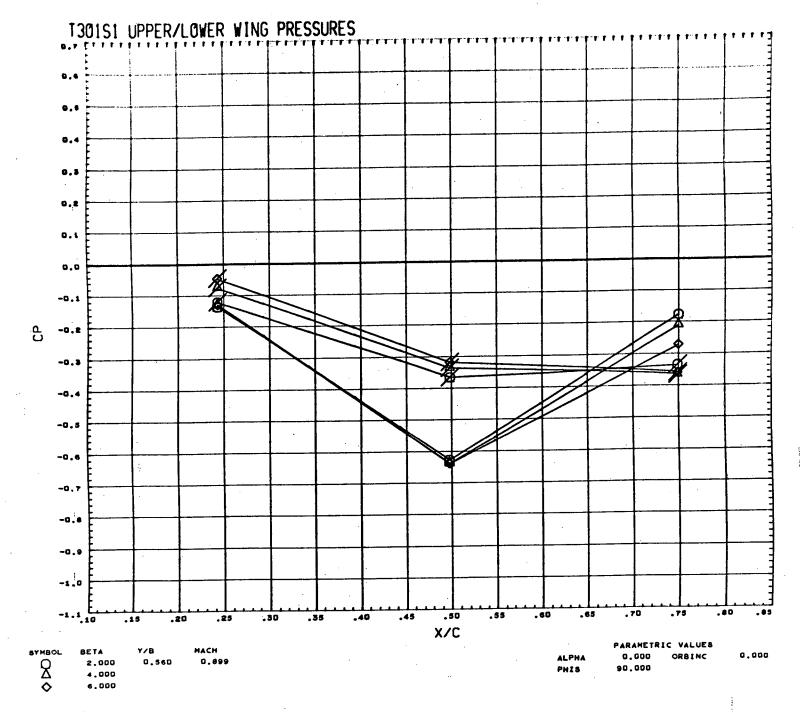
DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73014) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873014) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING
(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

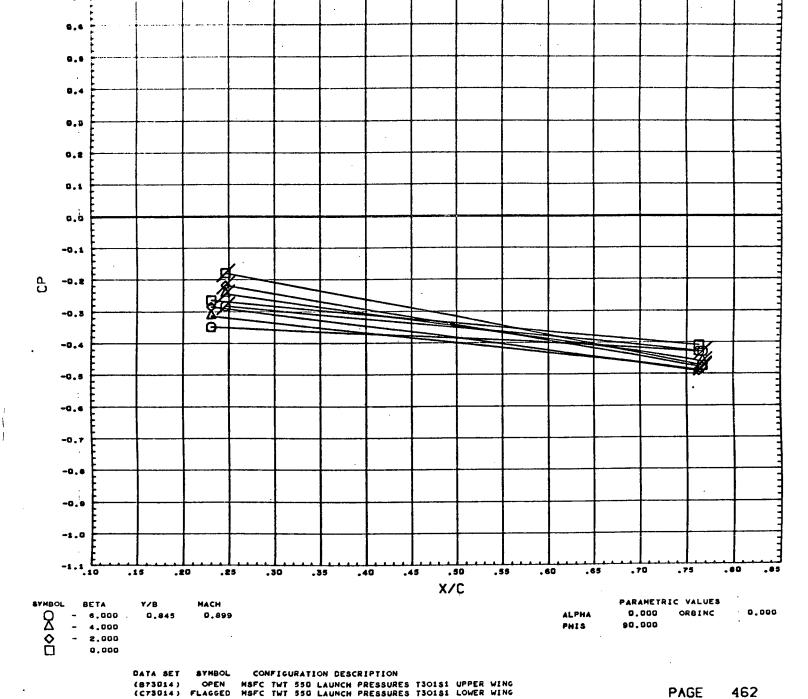


DATA SET SYMBOL CONFIGURATION DESCRIPTION

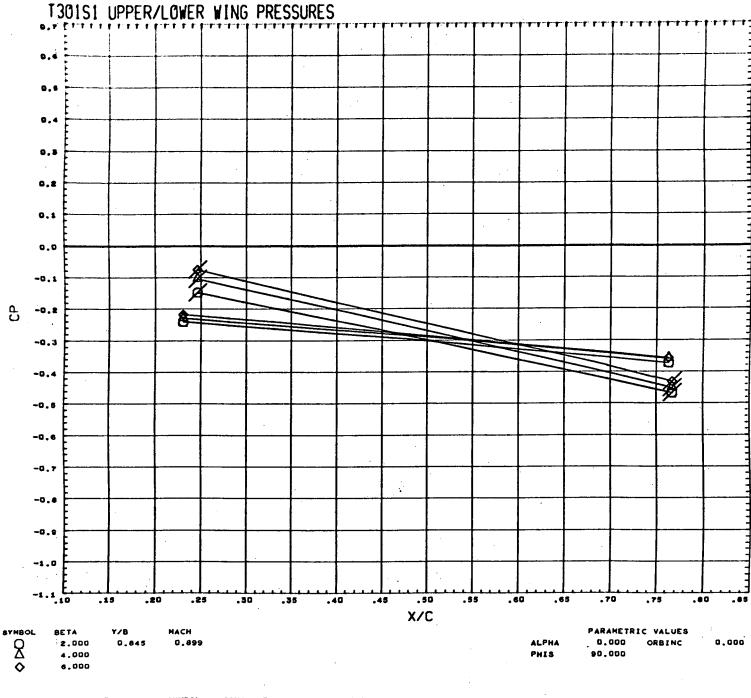
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(C73D14) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING

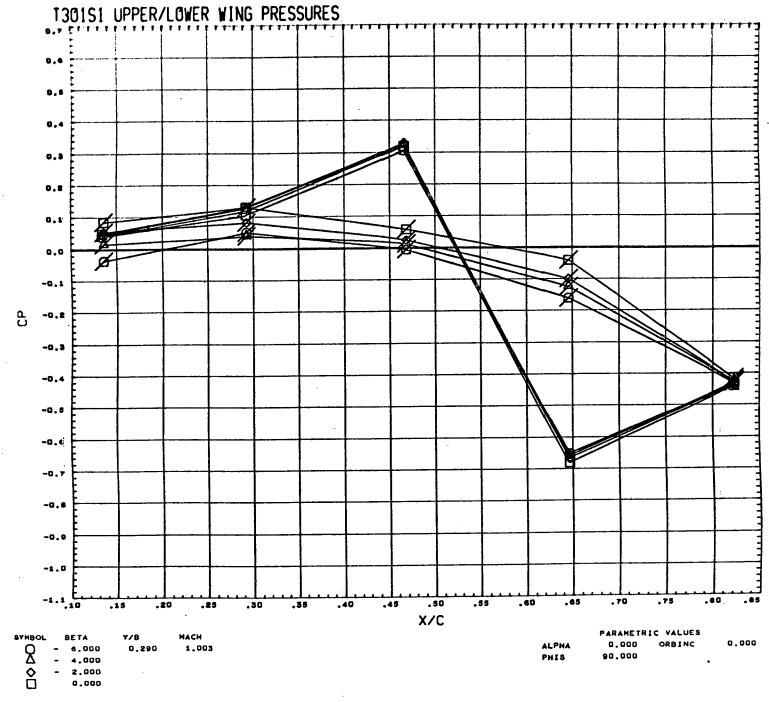




T301S1 UPPER/LOWER WING PRESSURES



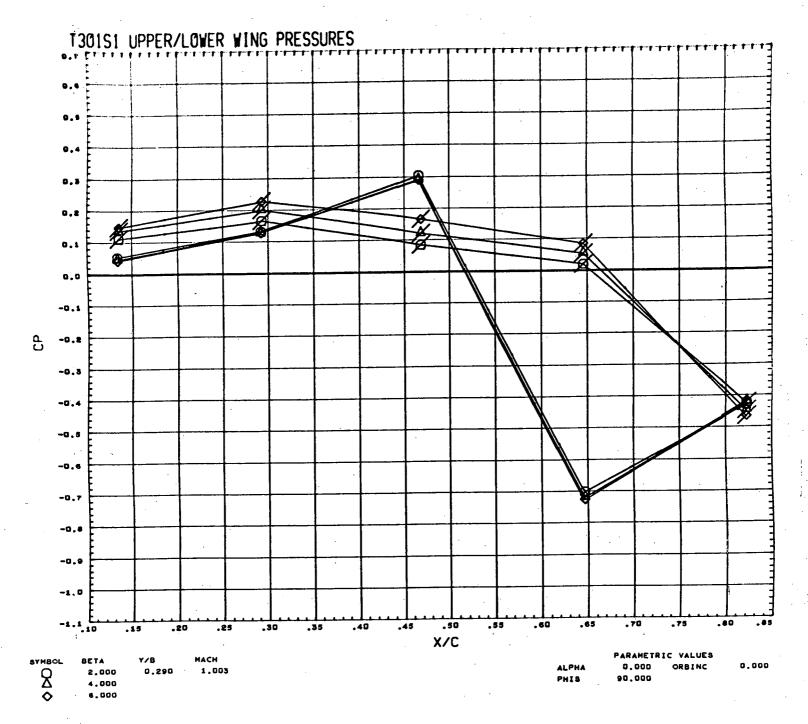
DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



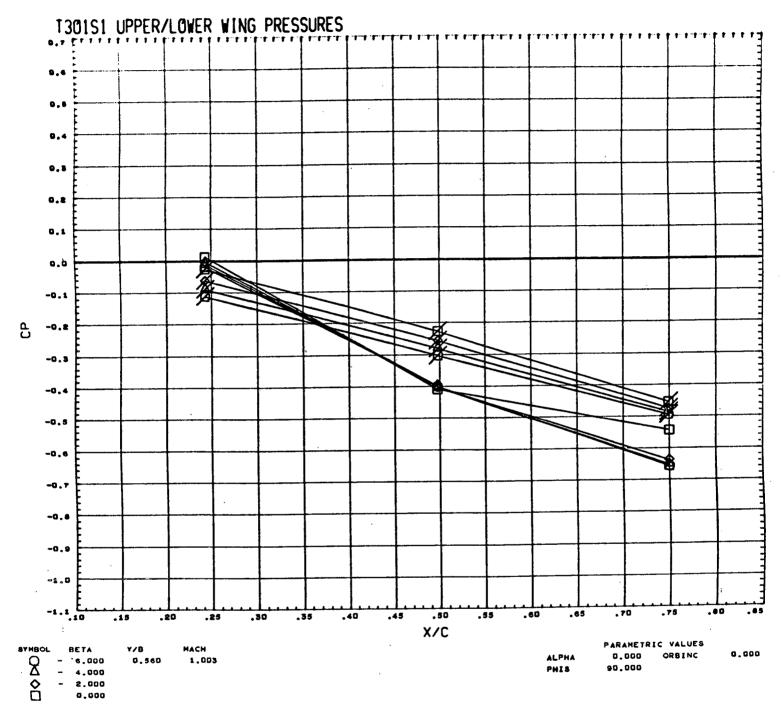
DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873014) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING

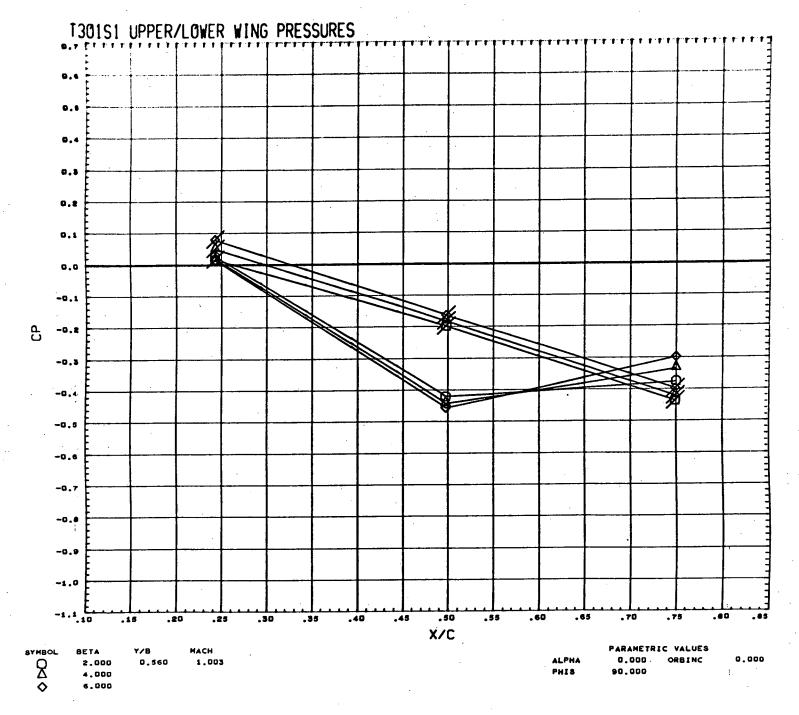
(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



OATA SET SYMBOL CONFIGURATION DESCRIPTION
(873014) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING
(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
-(873014) OPEN MSFC TWT 350 LAUNCH PRESSURES T30181 UPPER WING
-(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

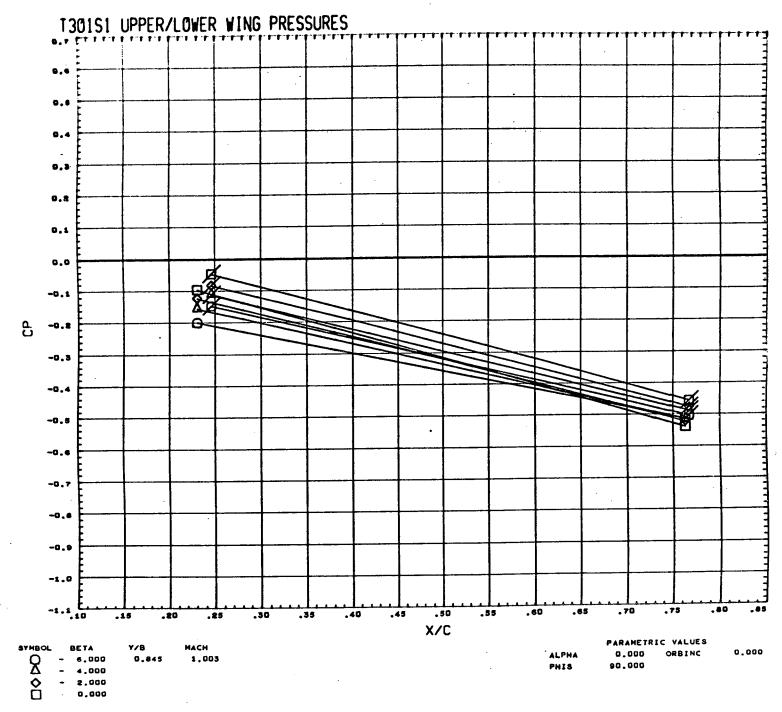


DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73D14) OPEN MSFC TWT 55D LAUNCH PRESSURES T301SI UPPER WING
(C73D14) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301SI LOWER WING

PAGE 467

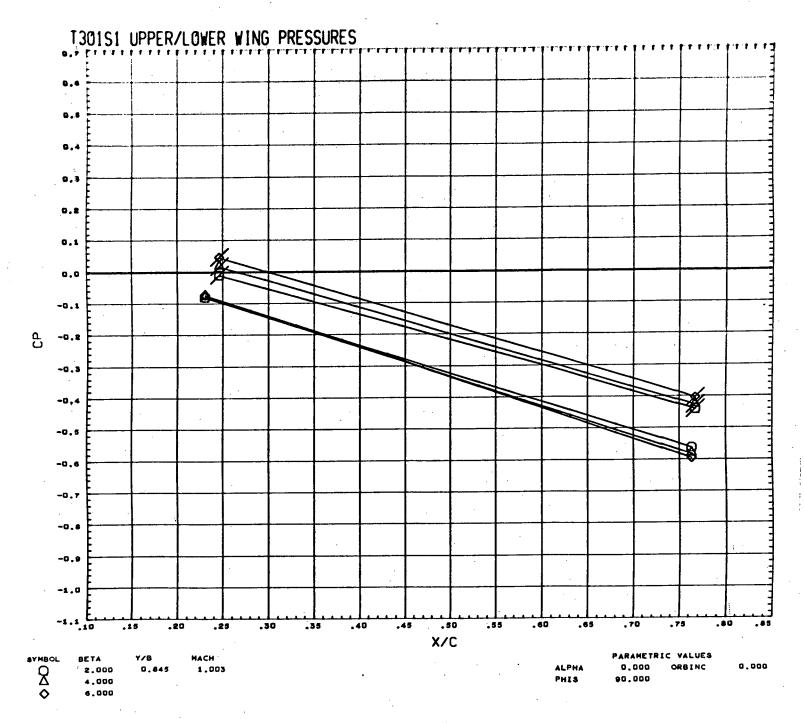
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DATA SET SYMBOL CONFIGURATION DESCRIPTION

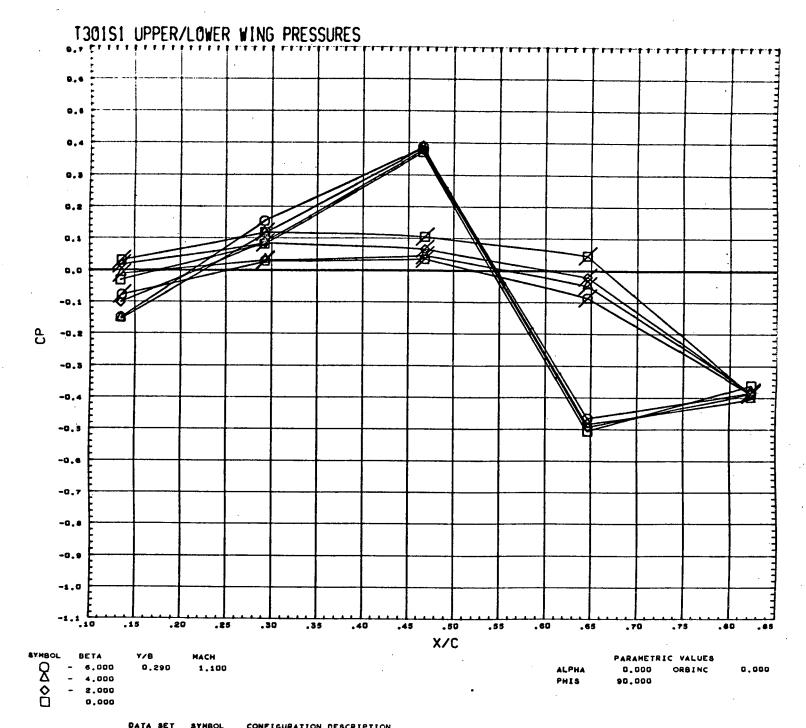
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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

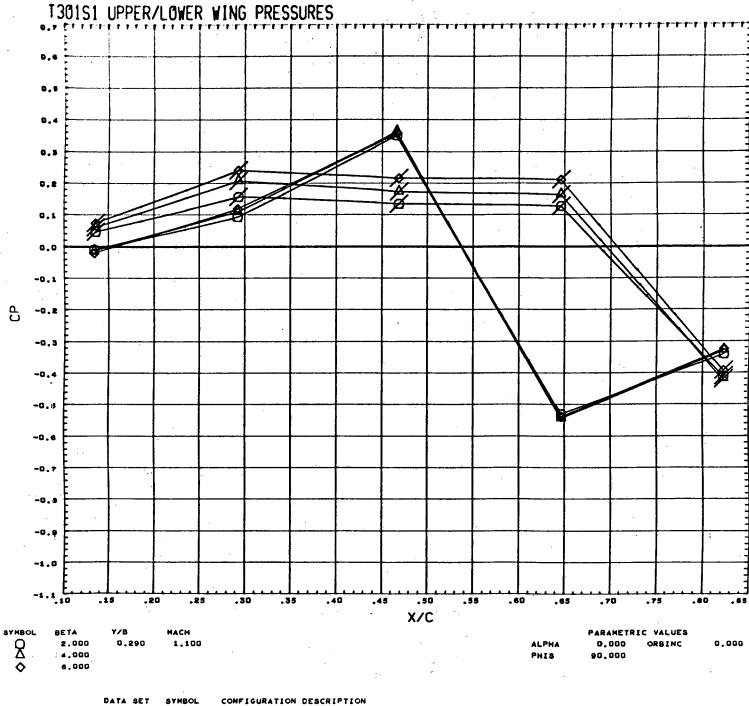
(873D14) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
(C73D14) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873014) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING

(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

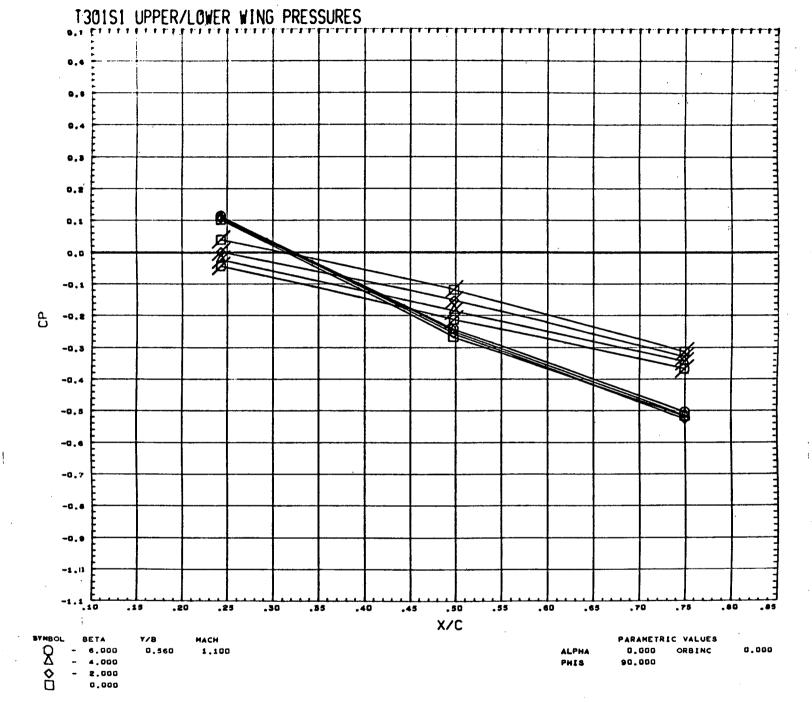


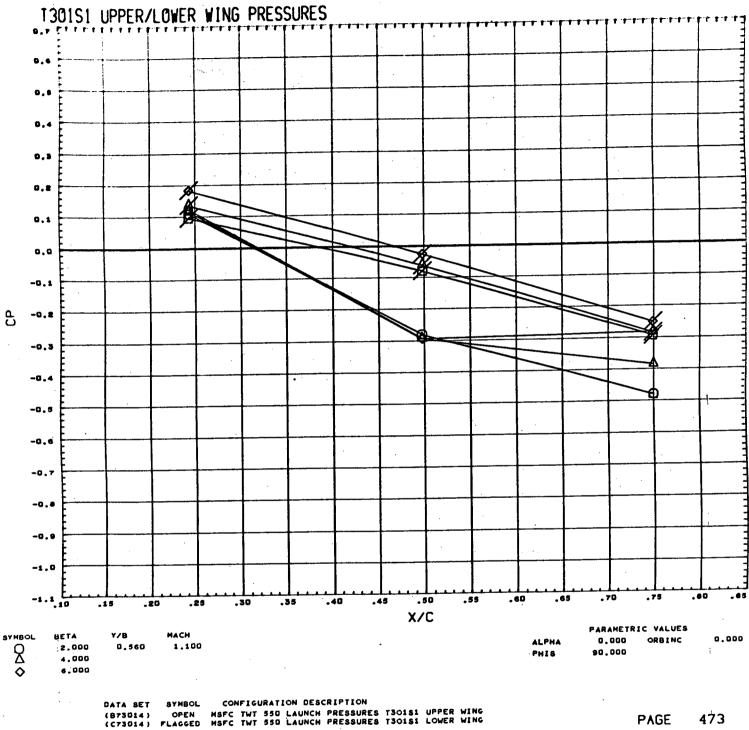
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(C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

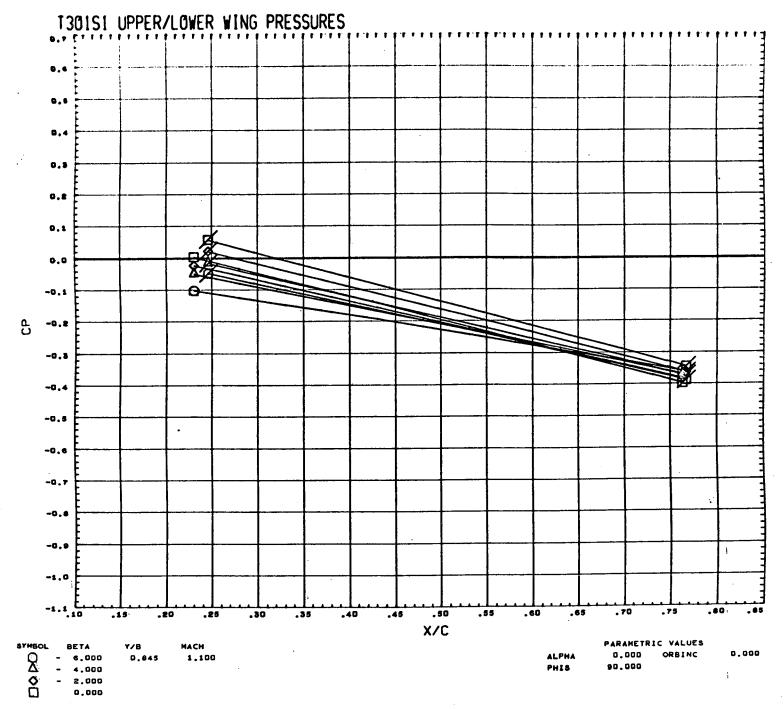
PAGE 472

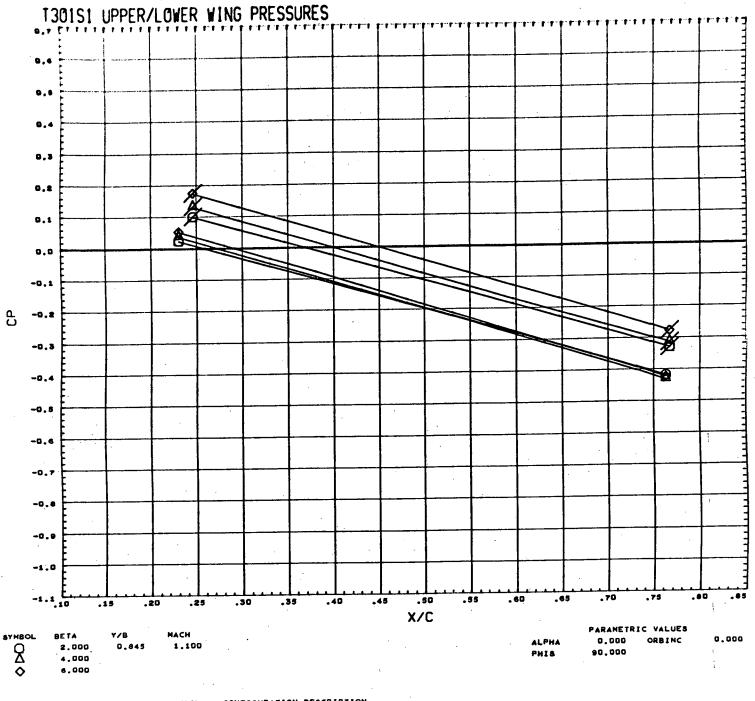
(873014) OPEN: MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73014) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER MING

DATA SET SYMBOL CONFIGURATION DESCRIPTION



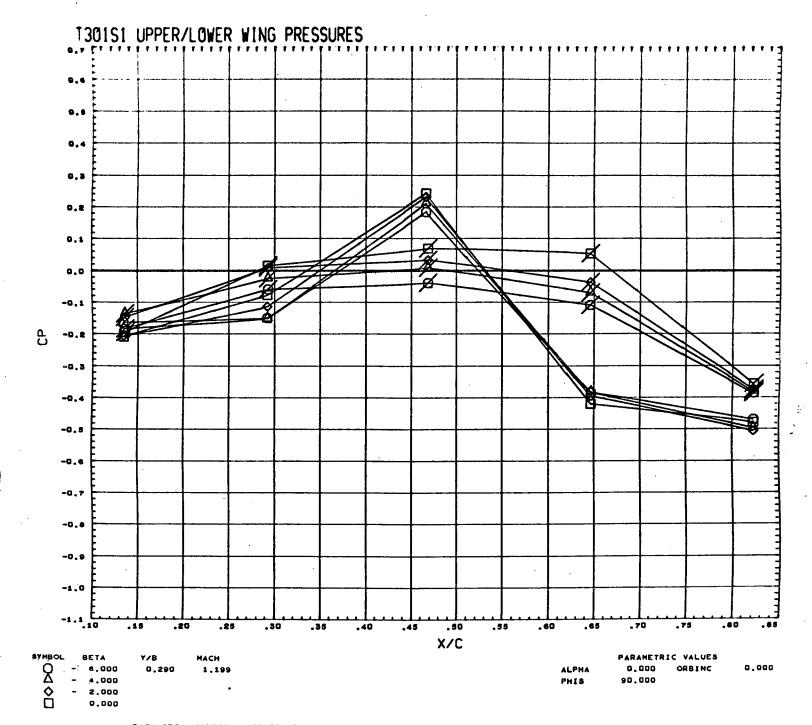


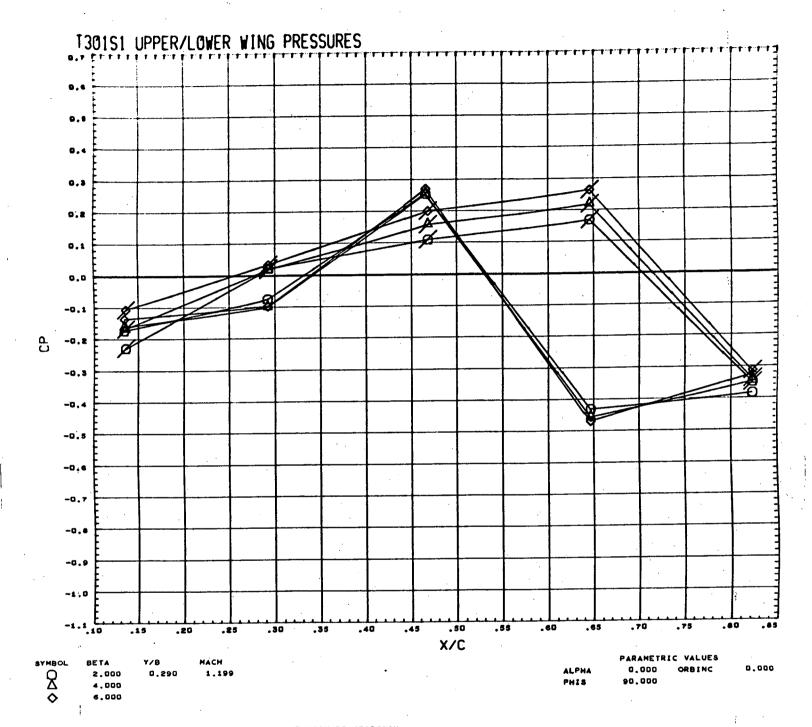


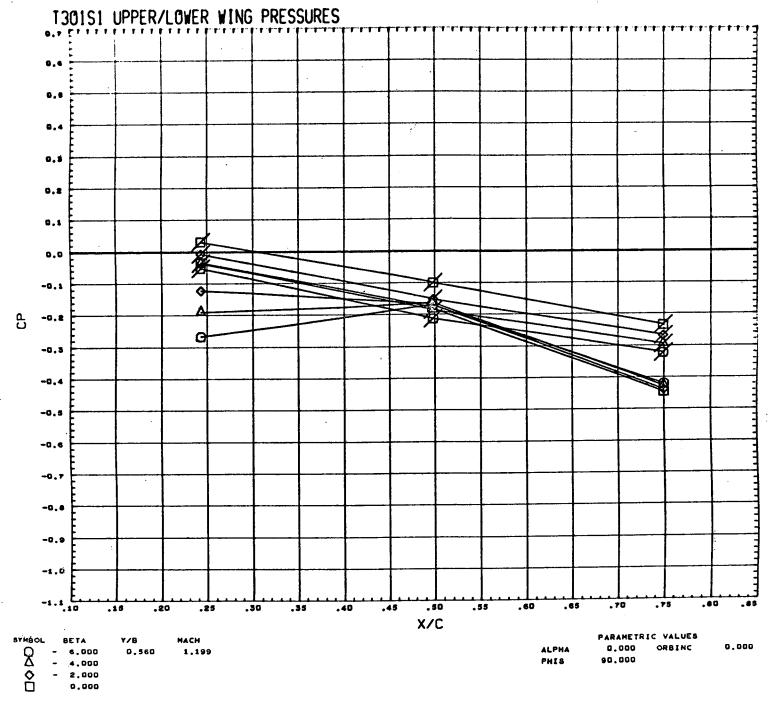


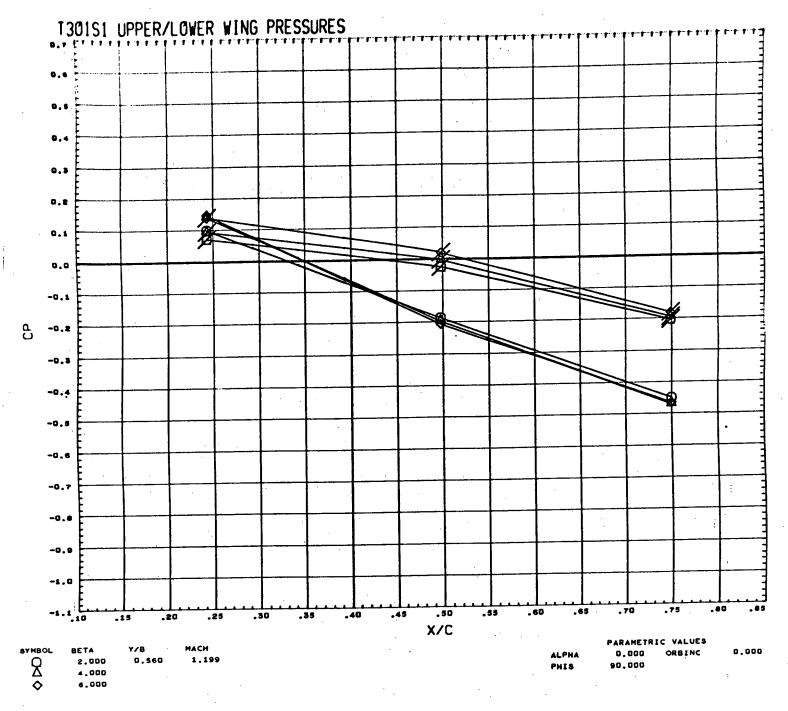
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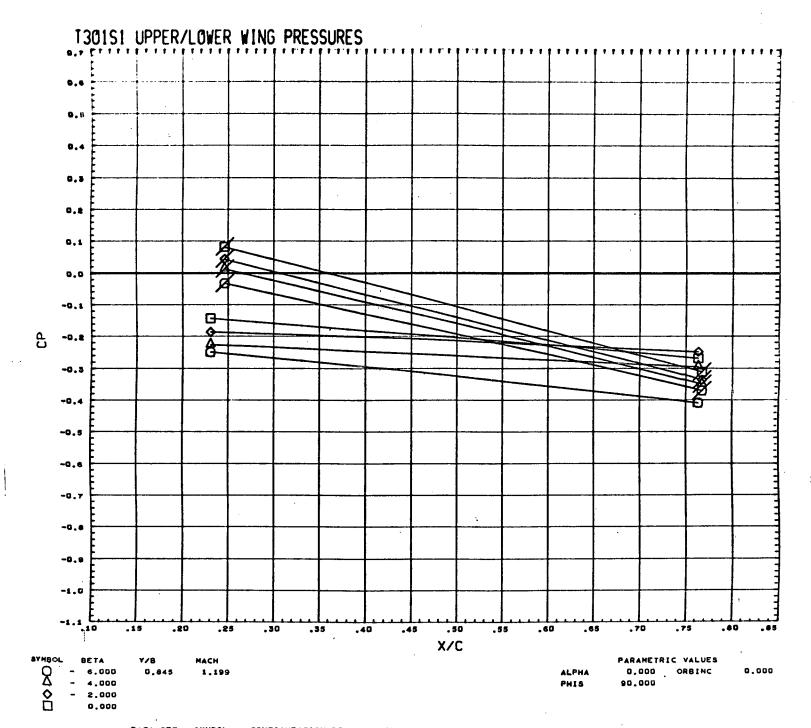
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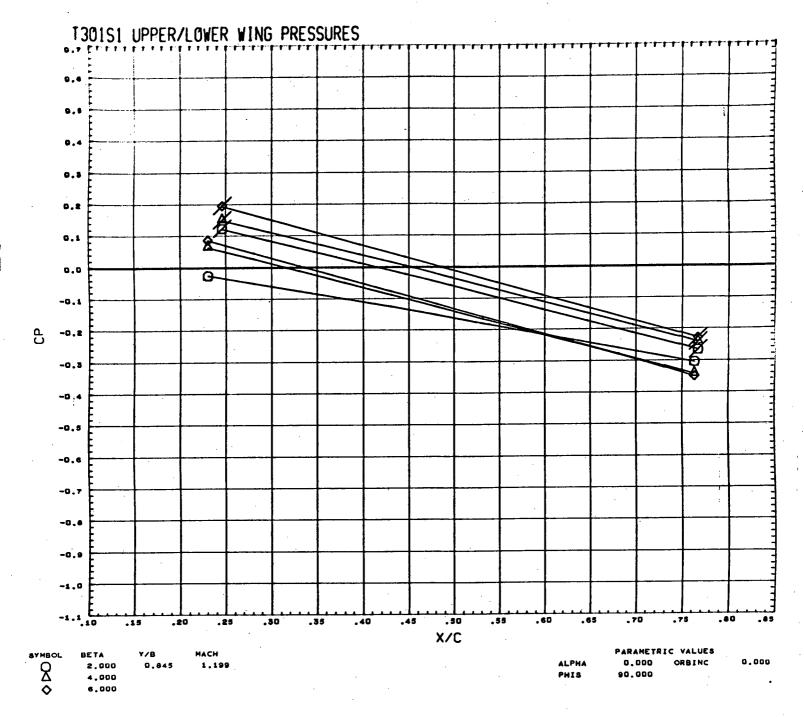






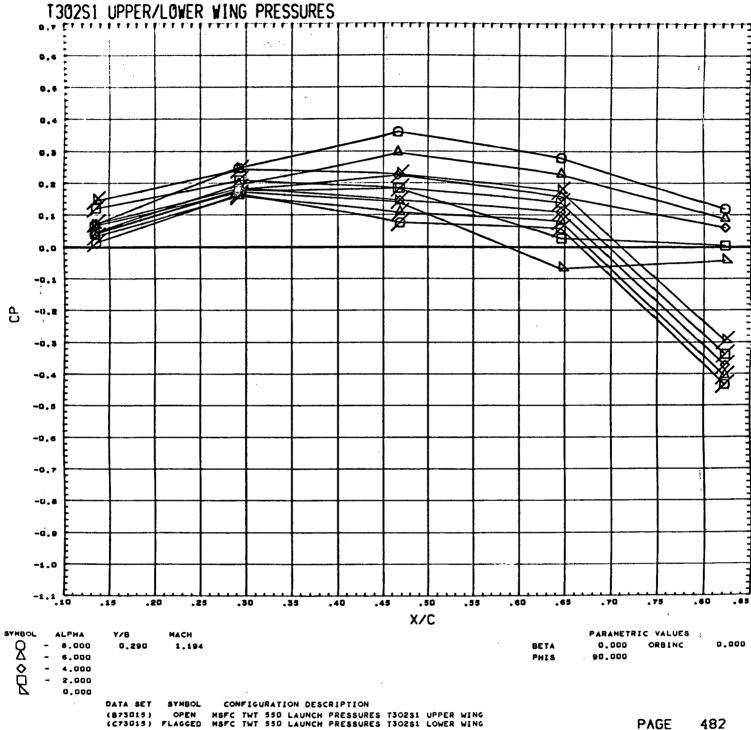


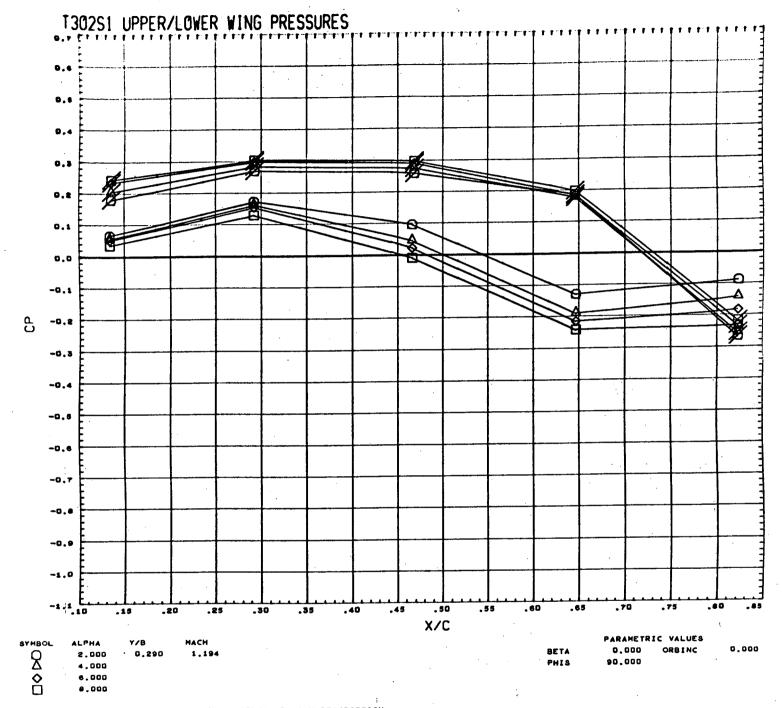


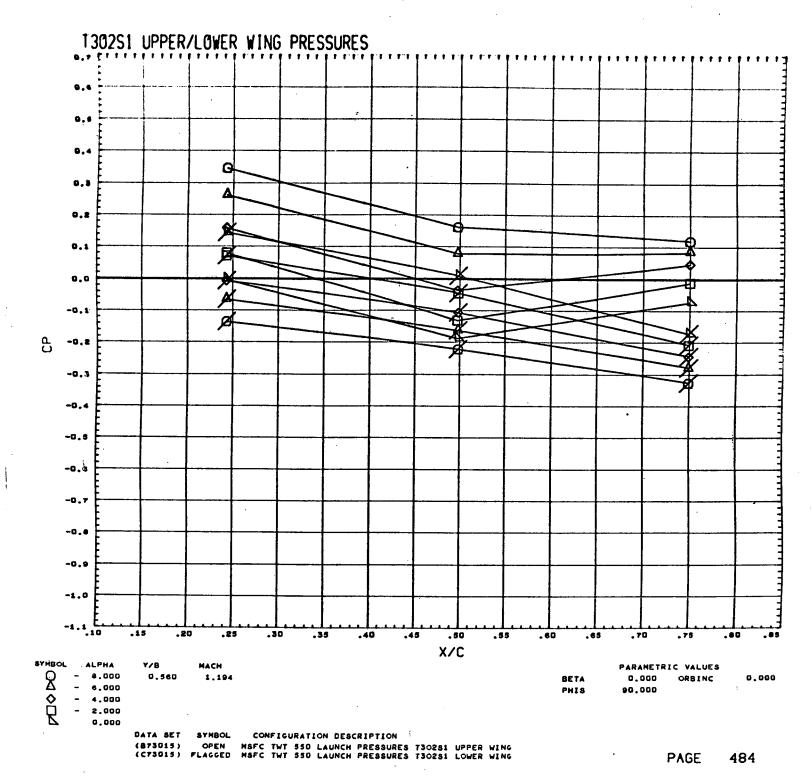


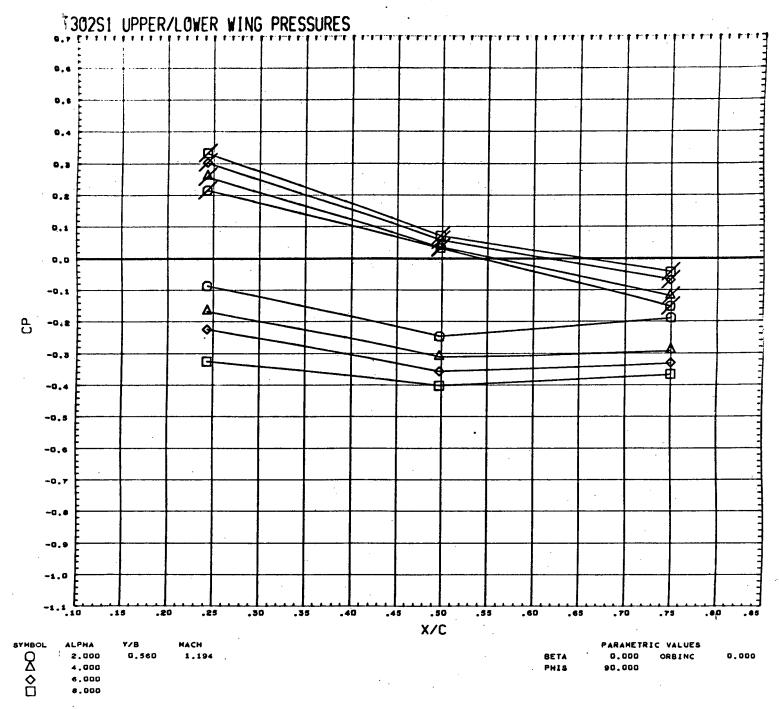
PAGE 481

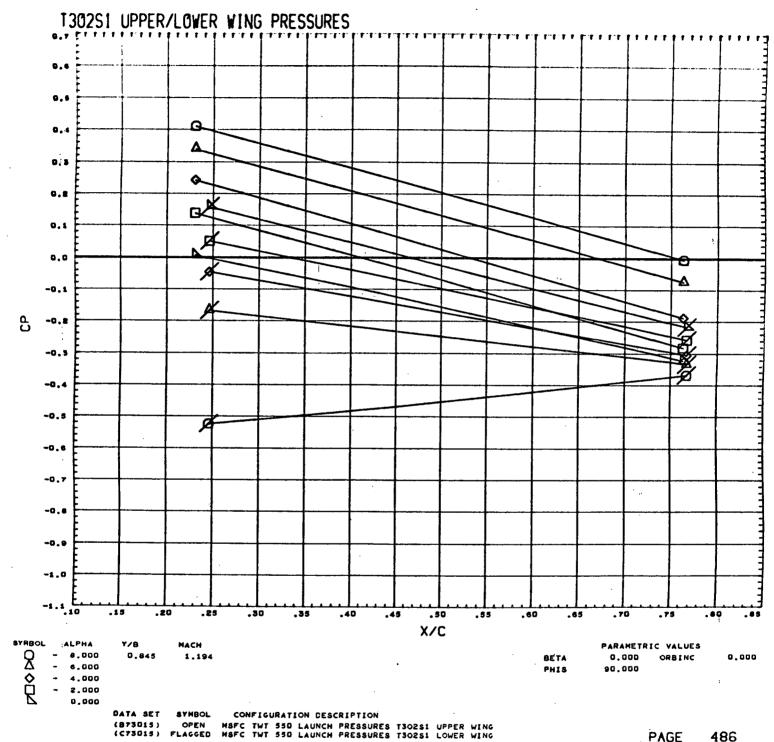
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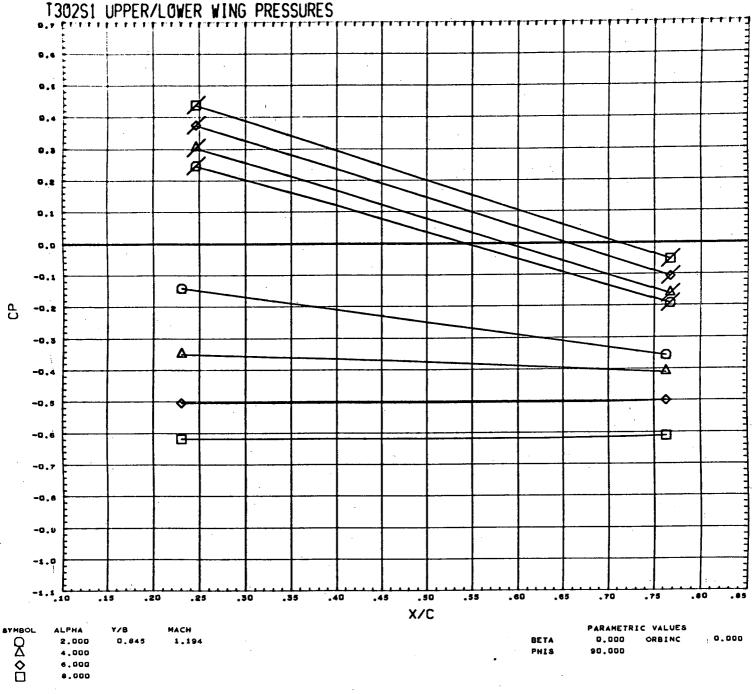


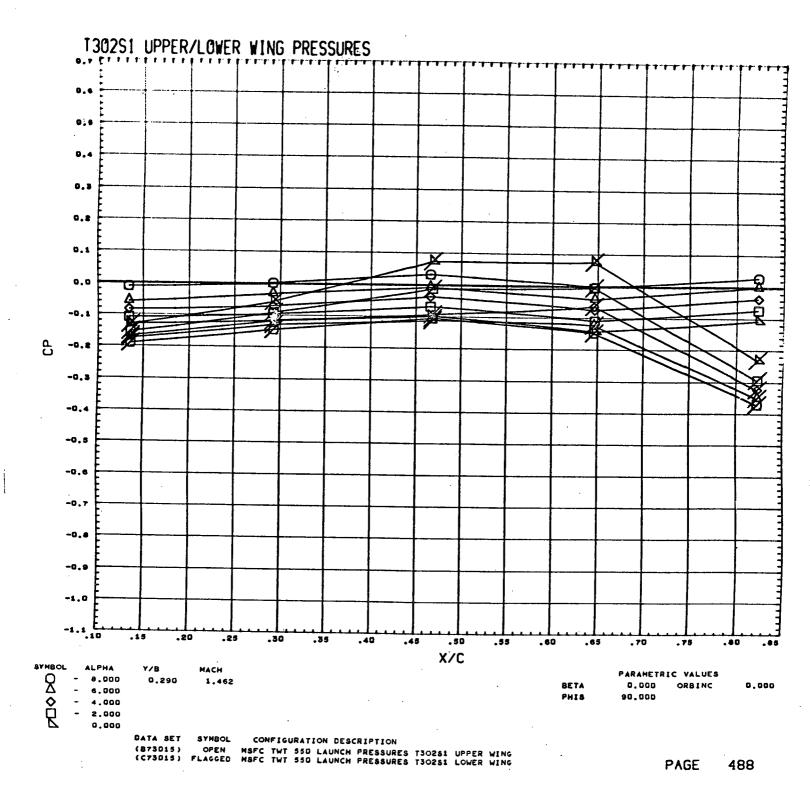


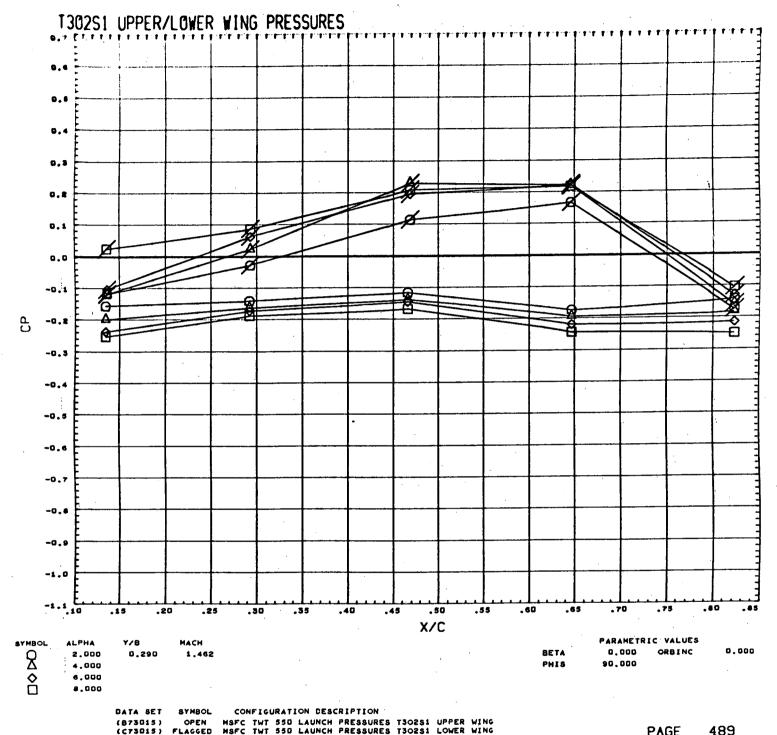


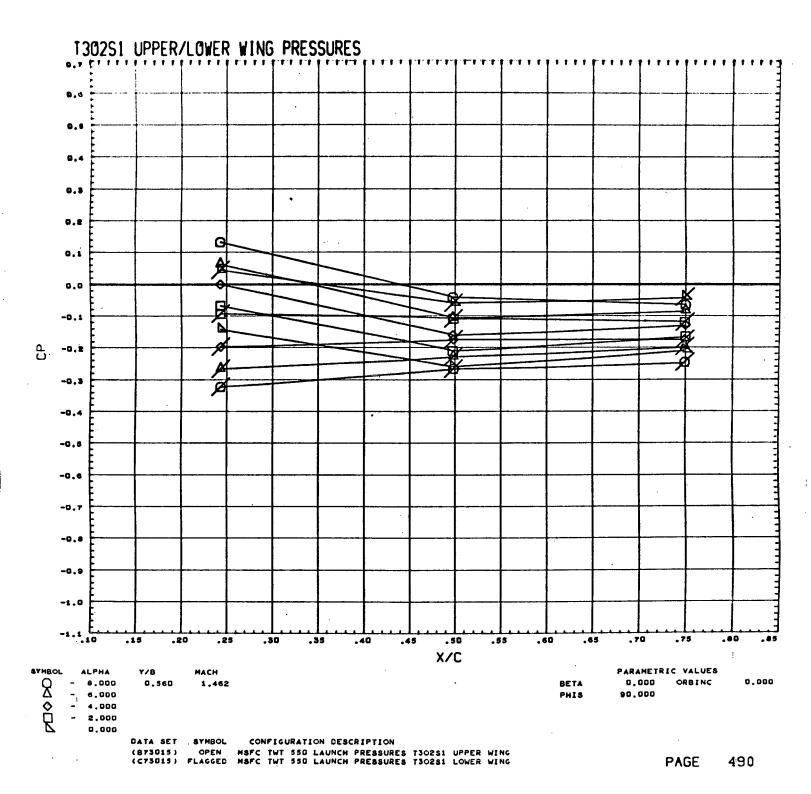


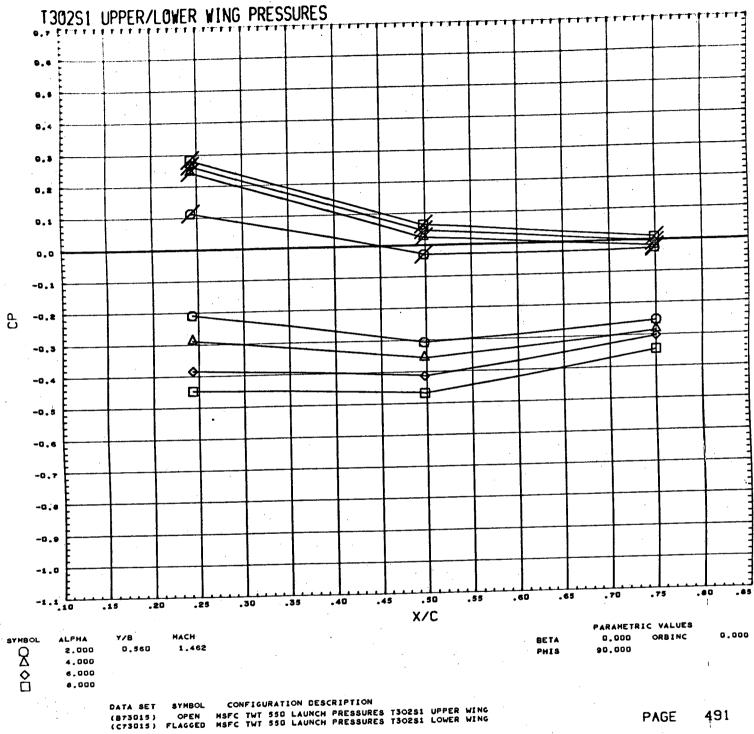


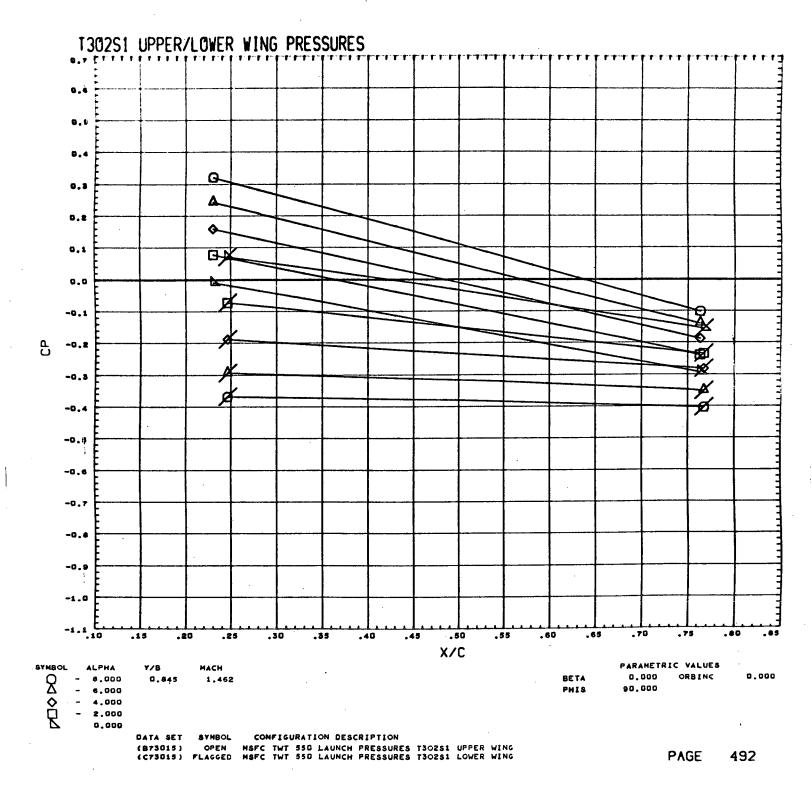


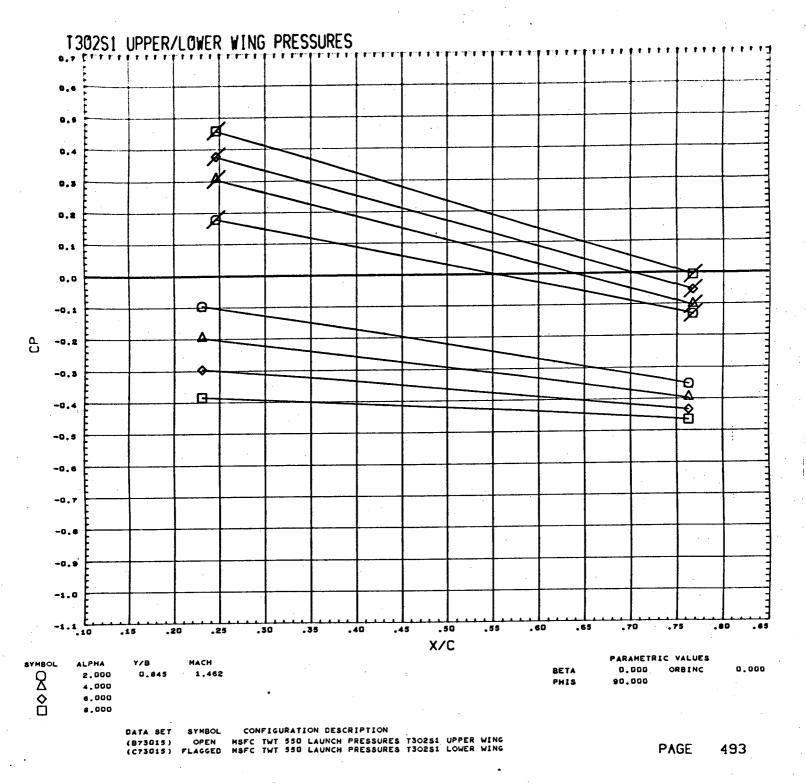


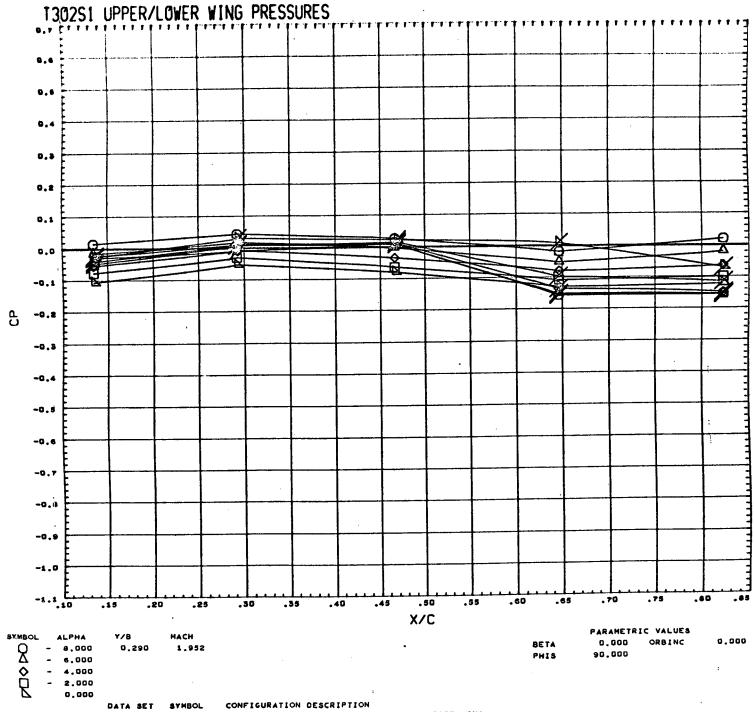


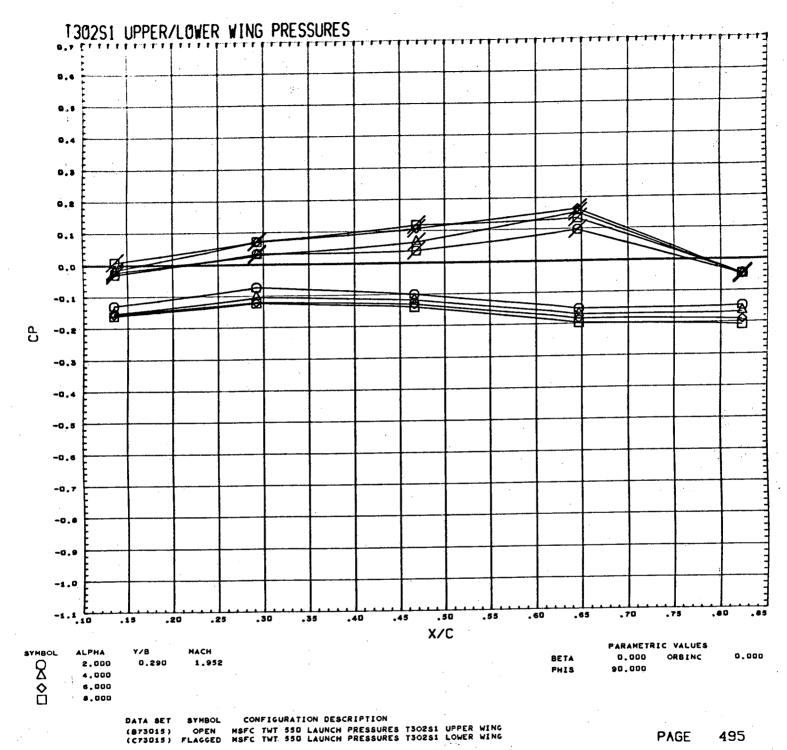


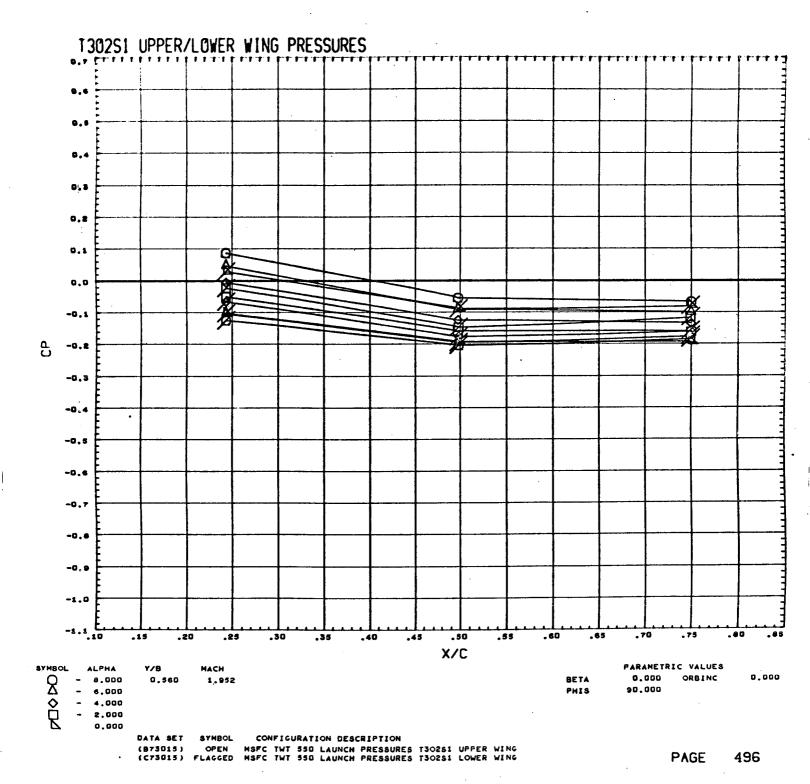


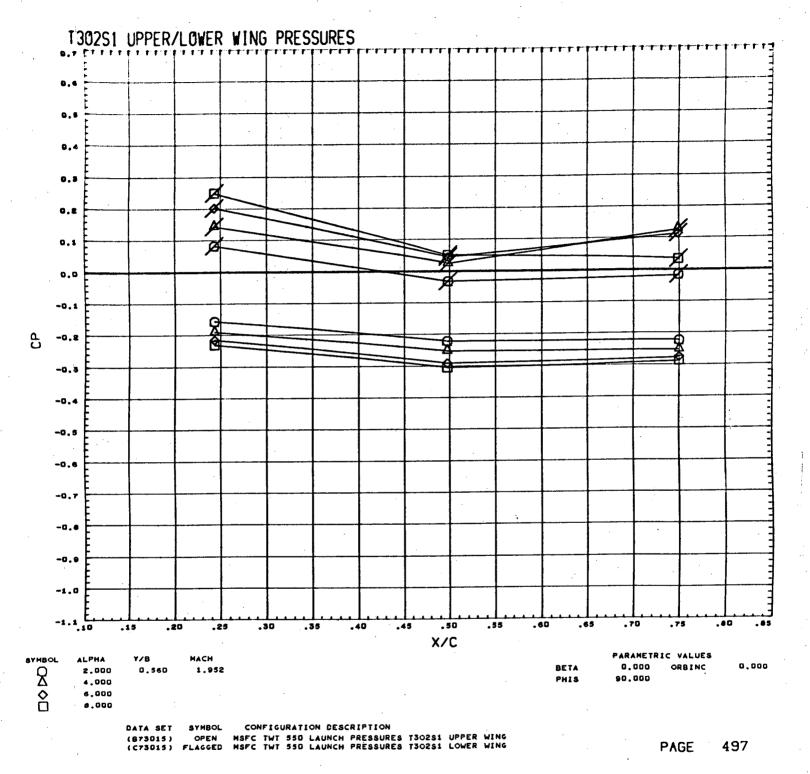


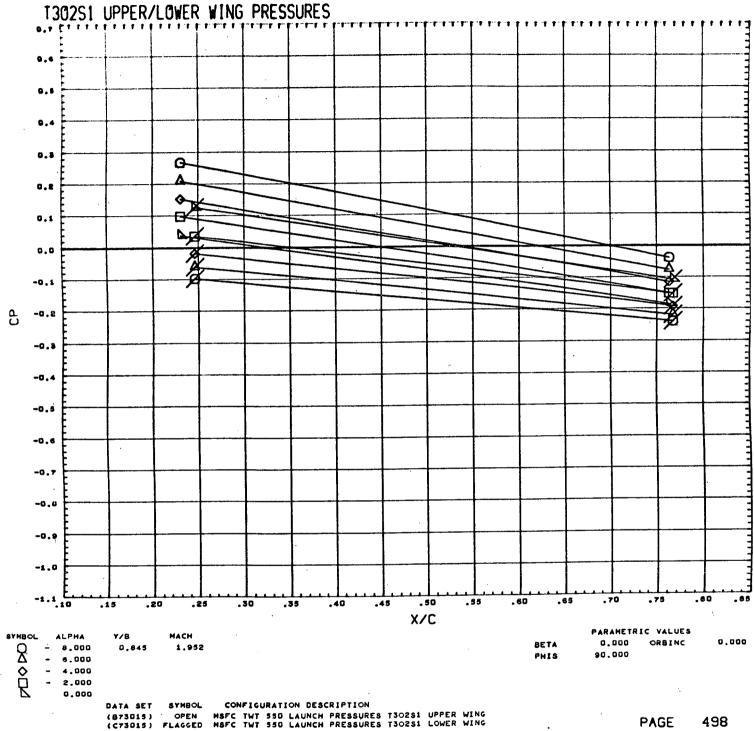


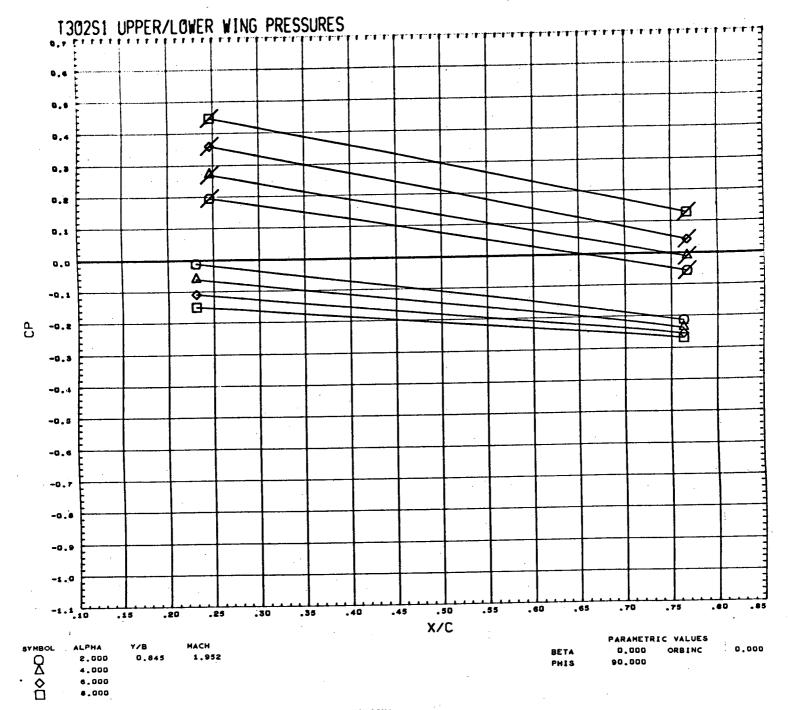


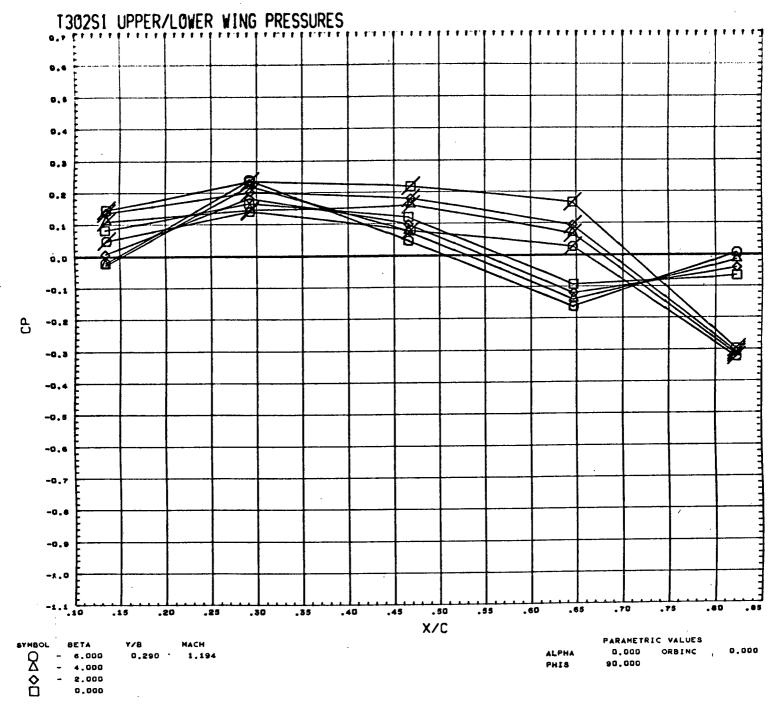


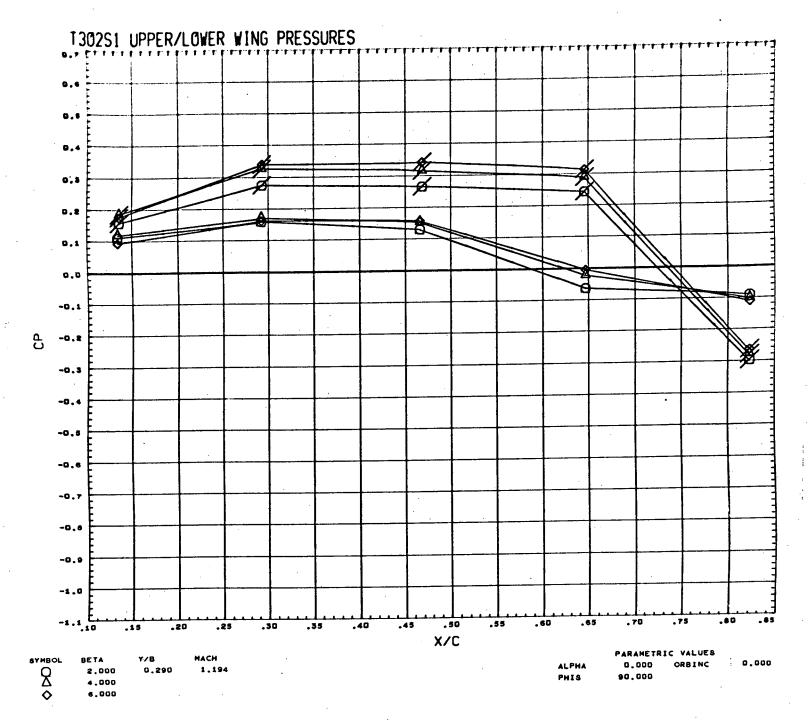


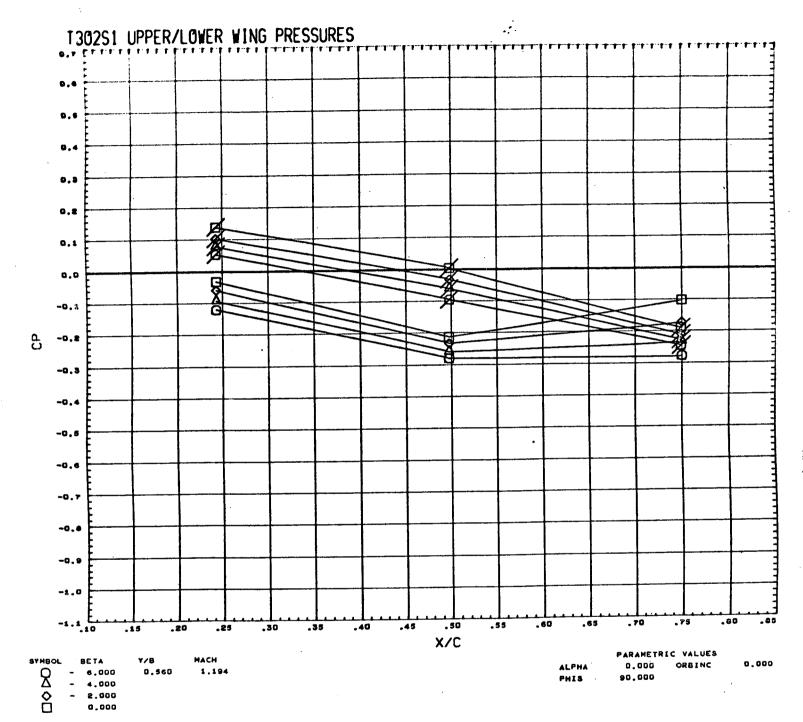


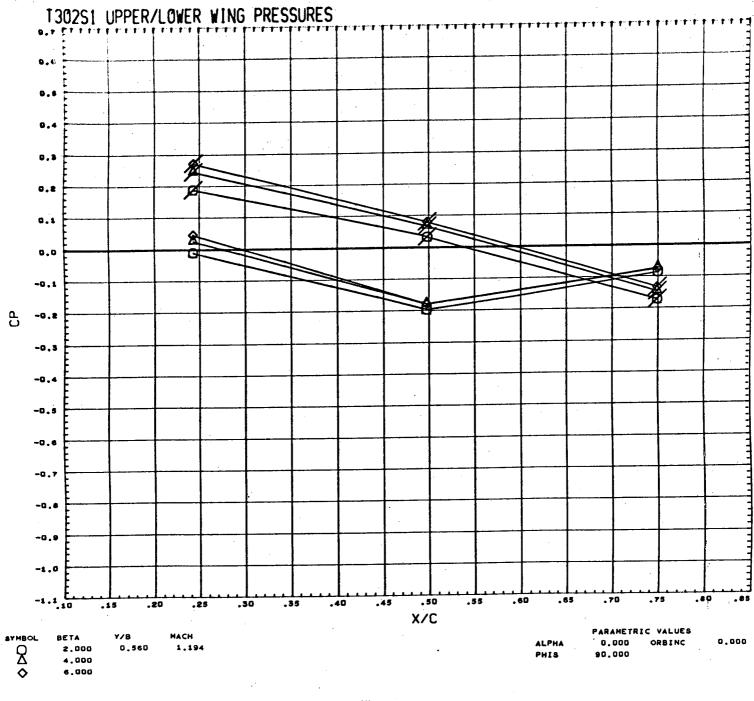


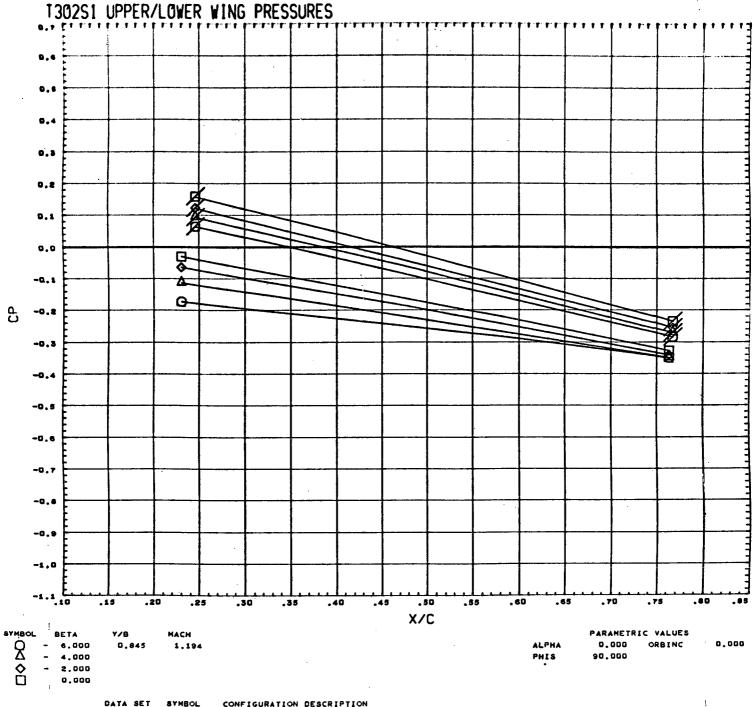


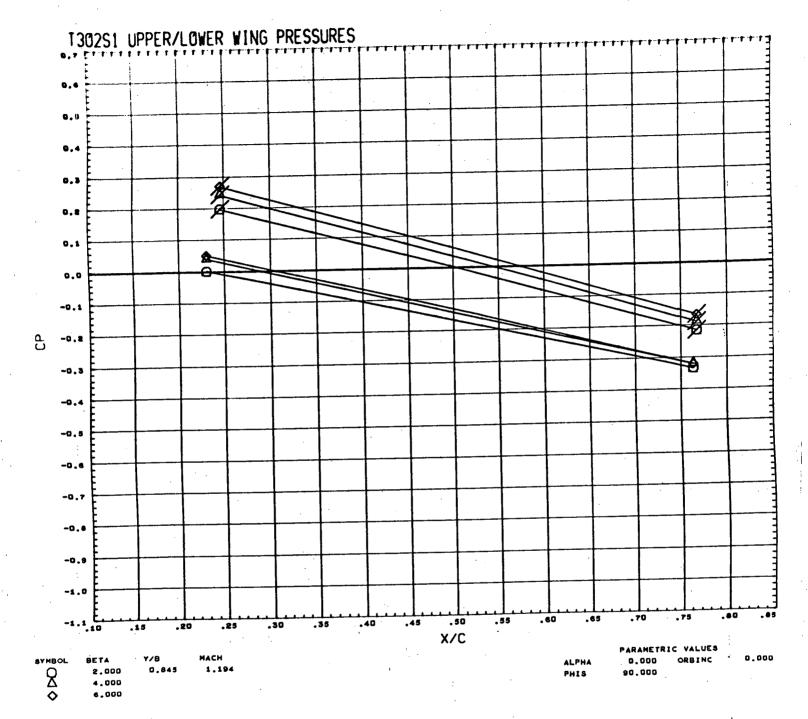


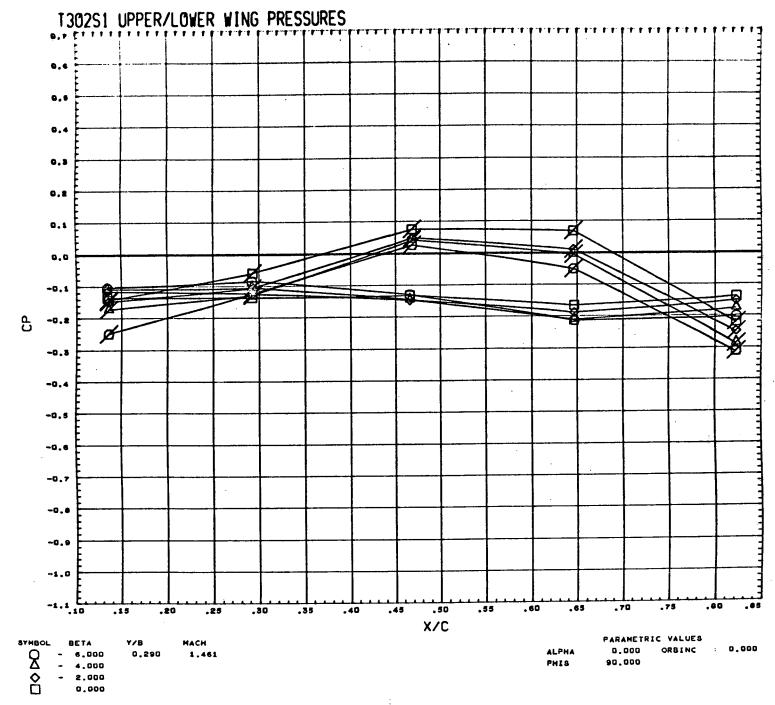


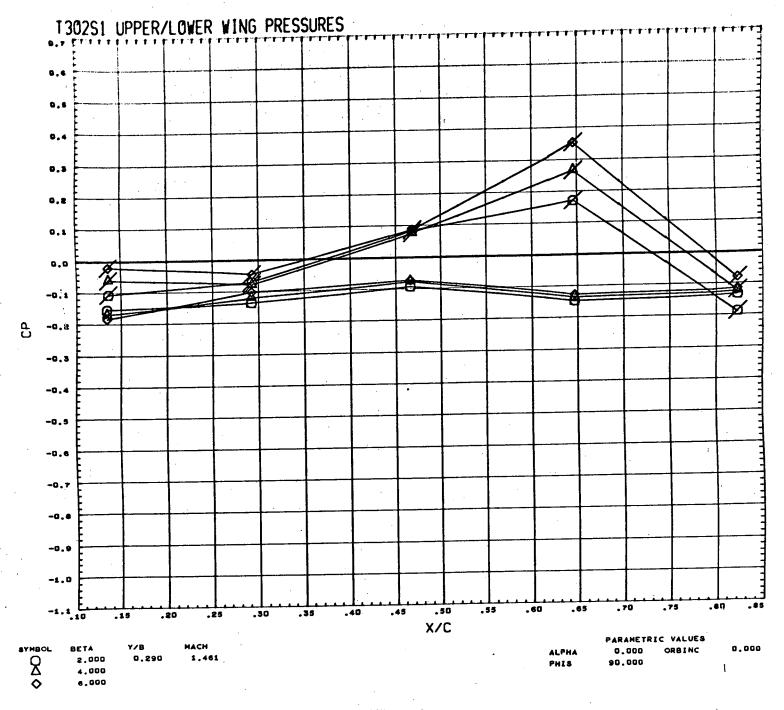


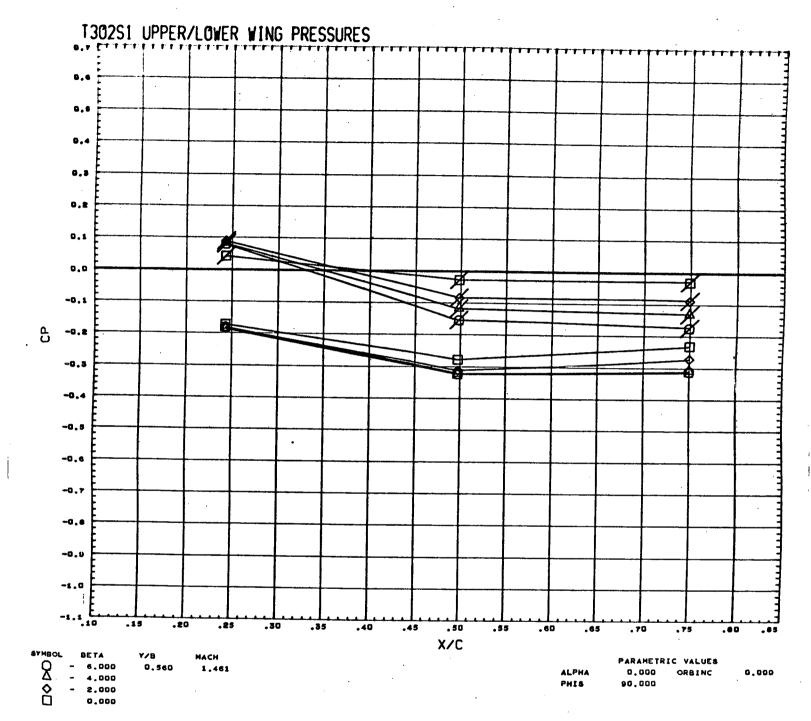


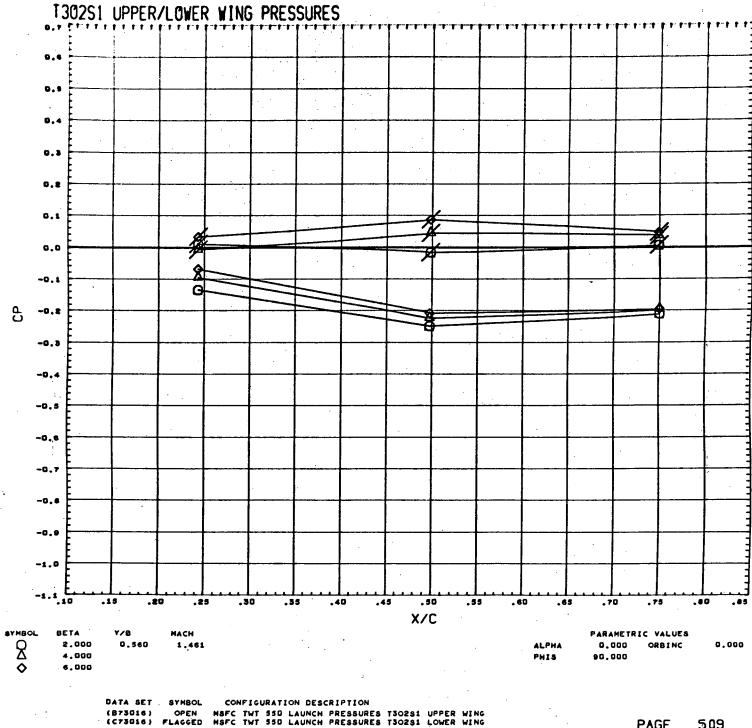






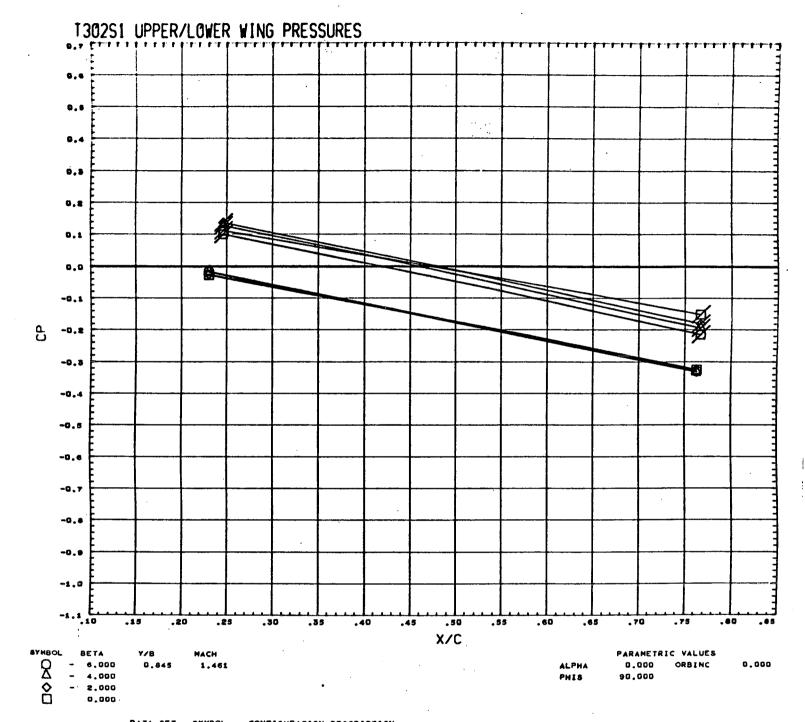


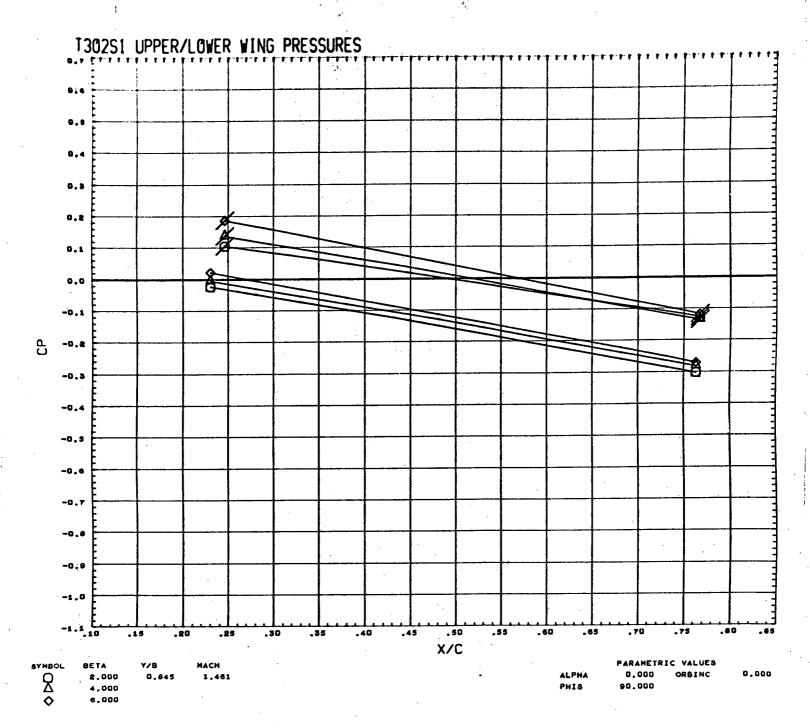


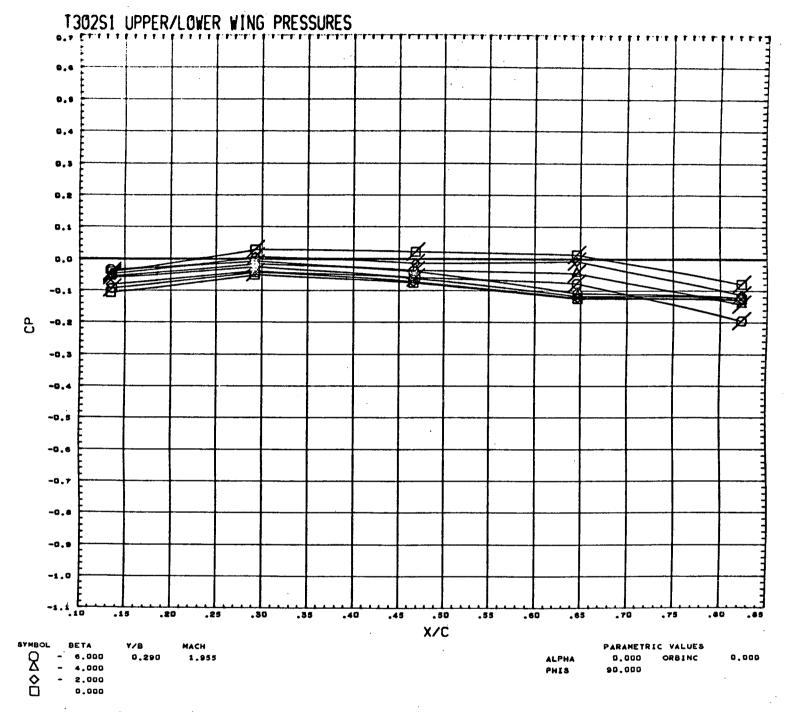


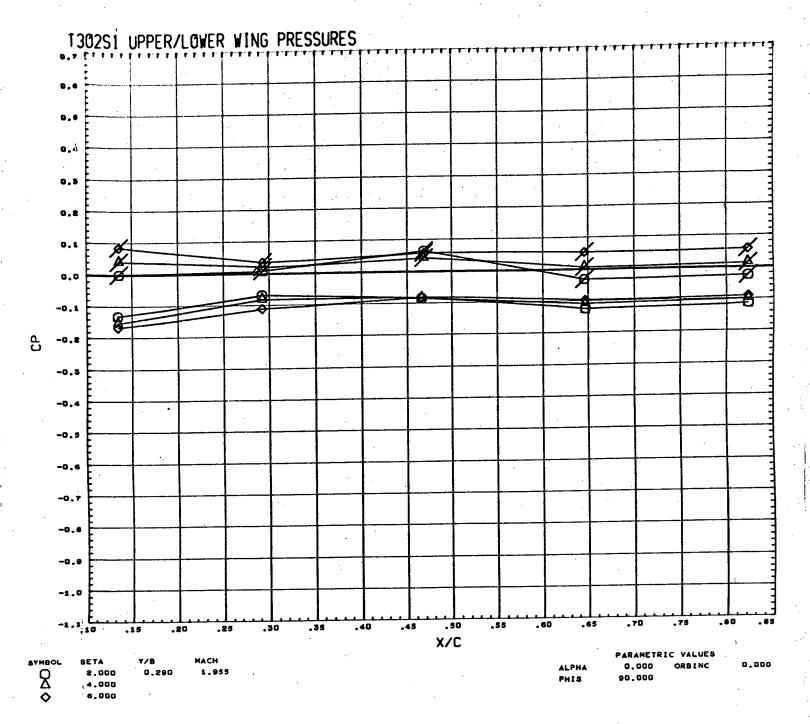
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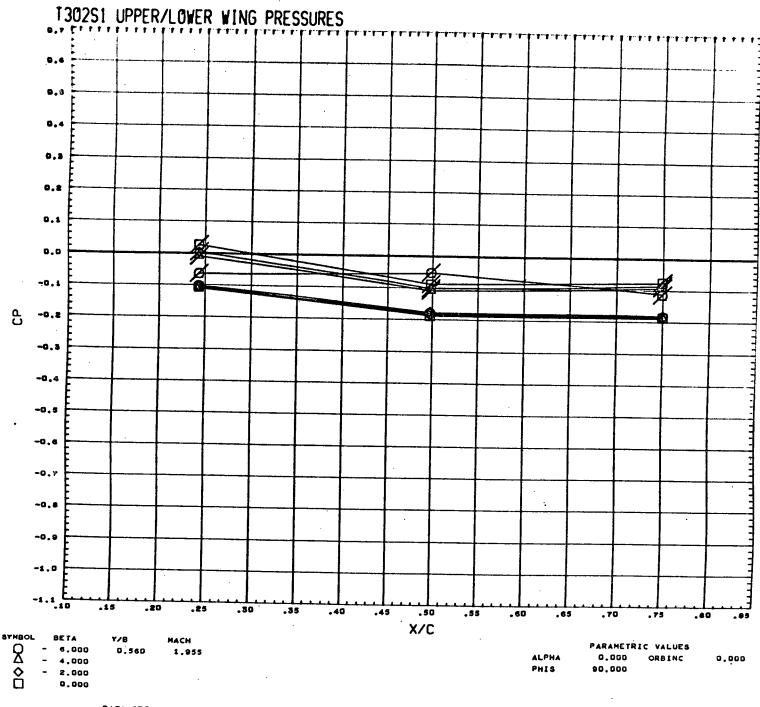
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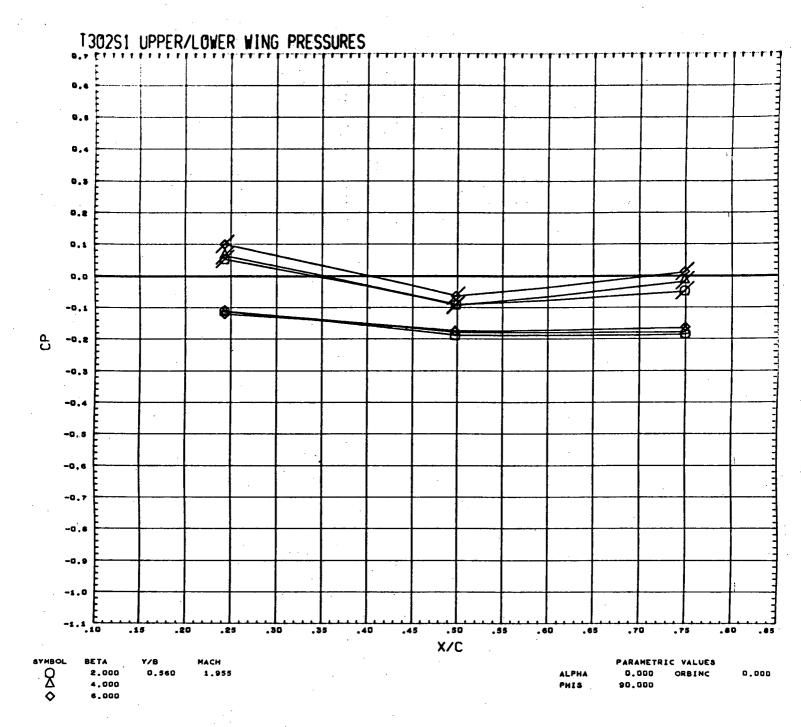


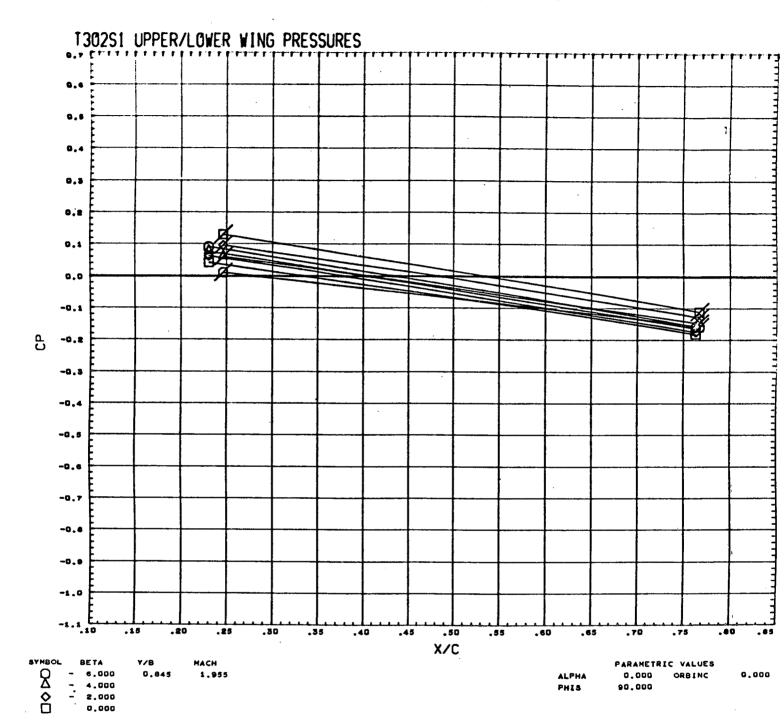


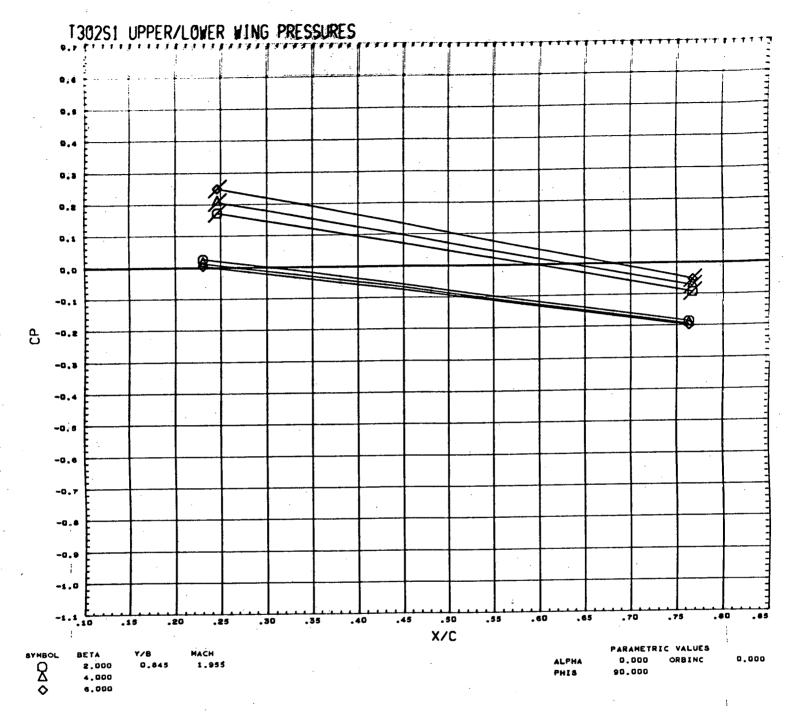


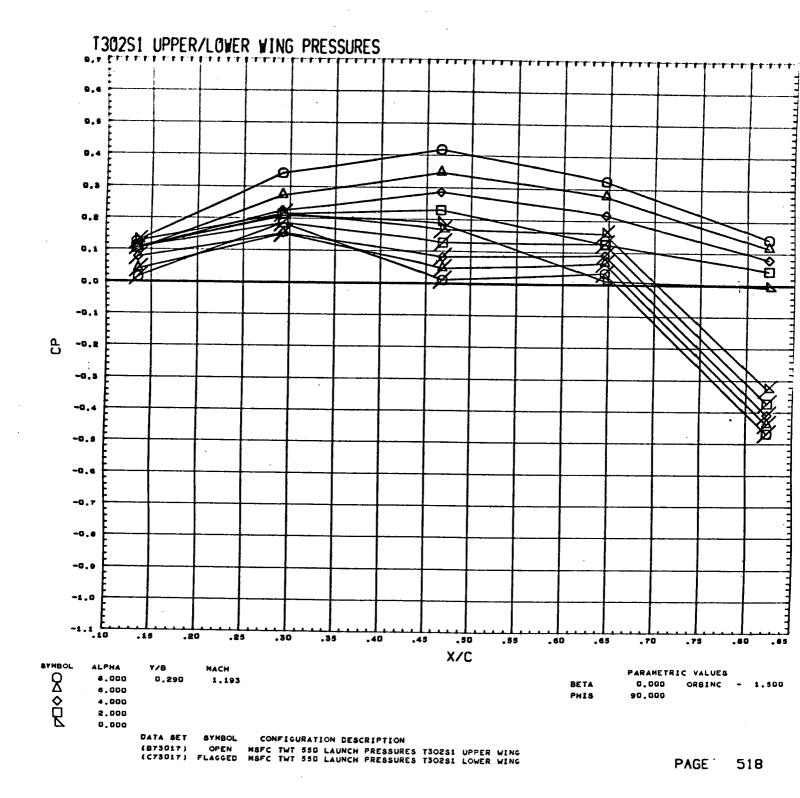


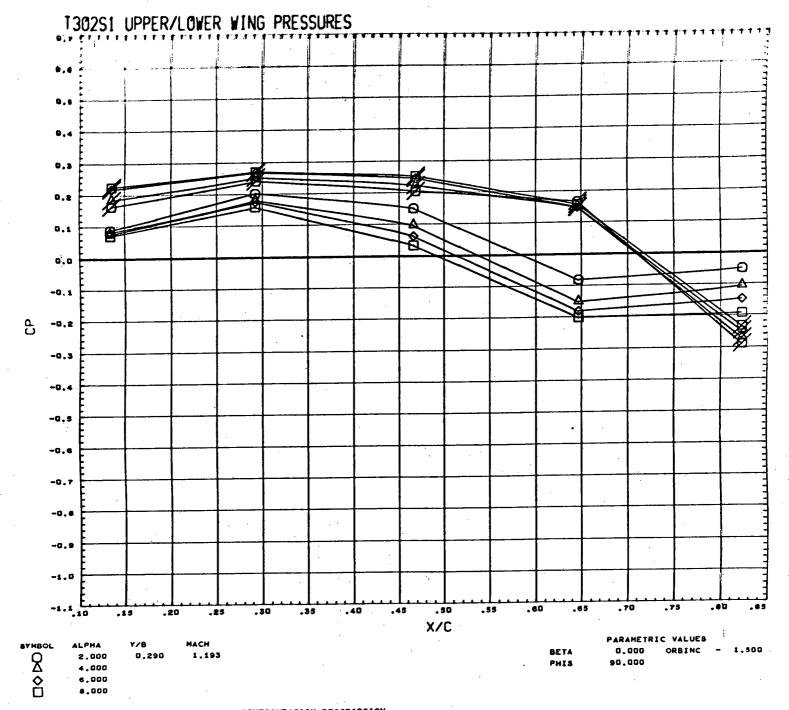


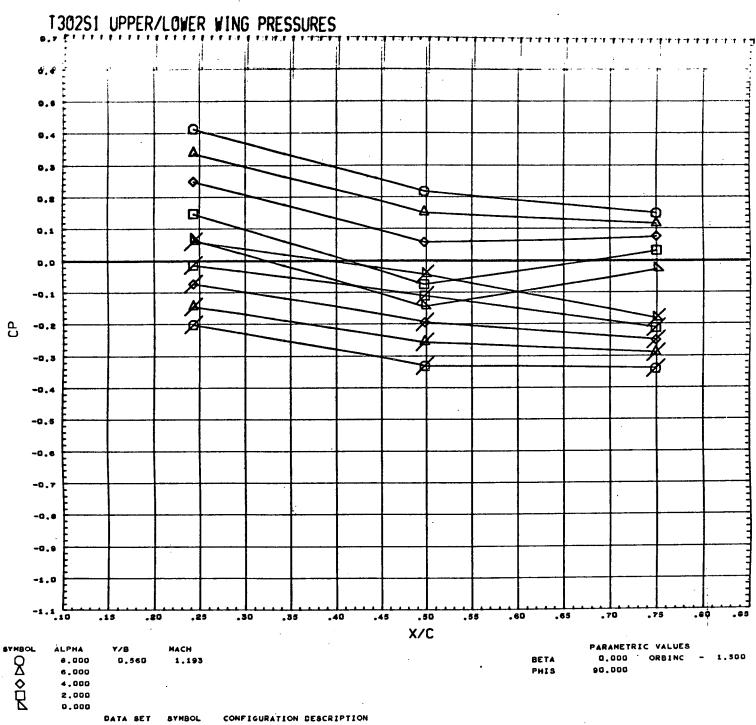


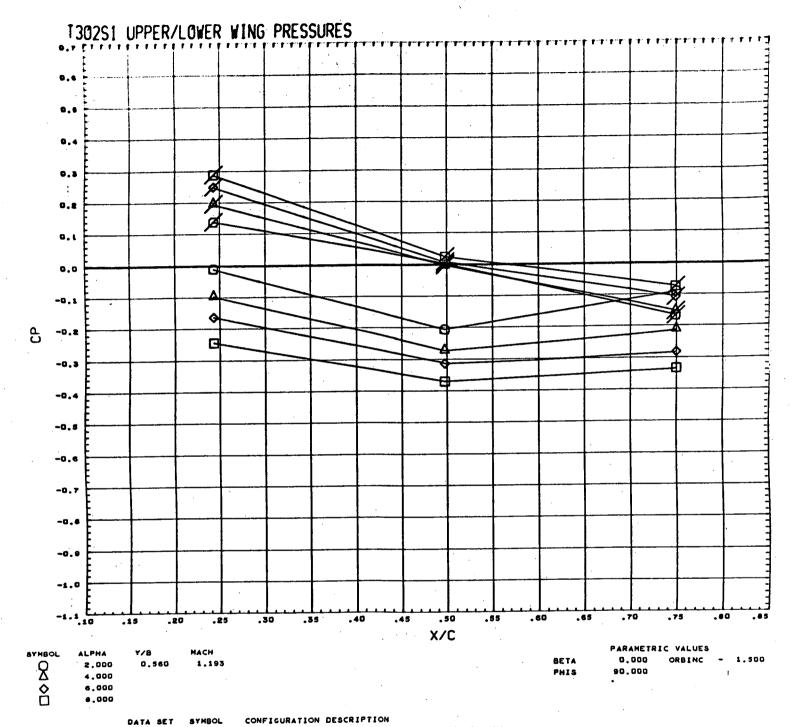




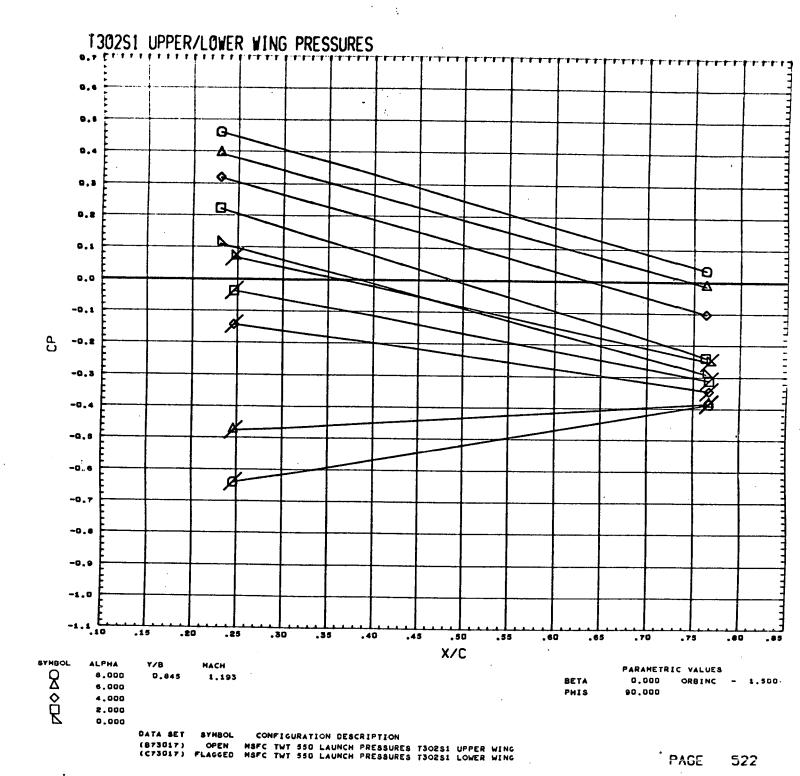


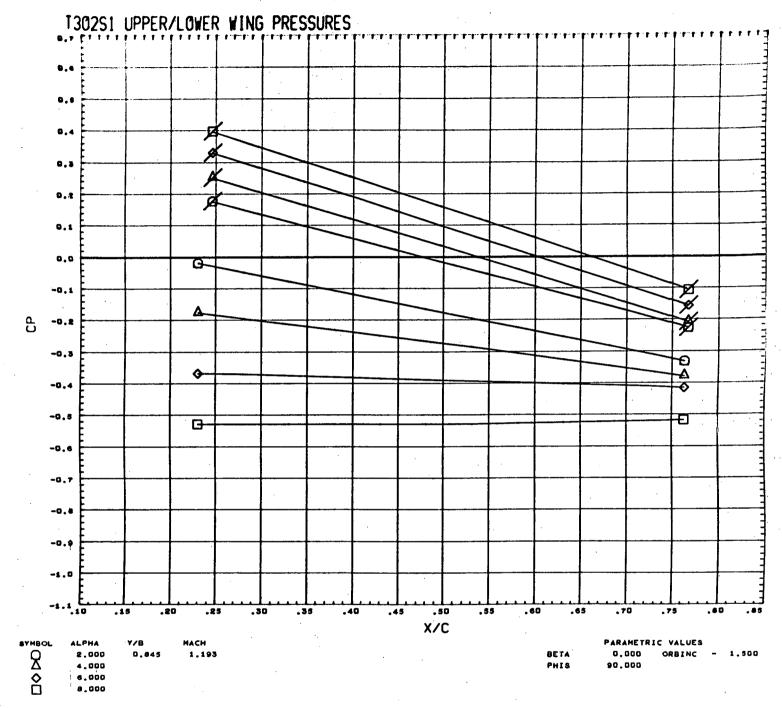


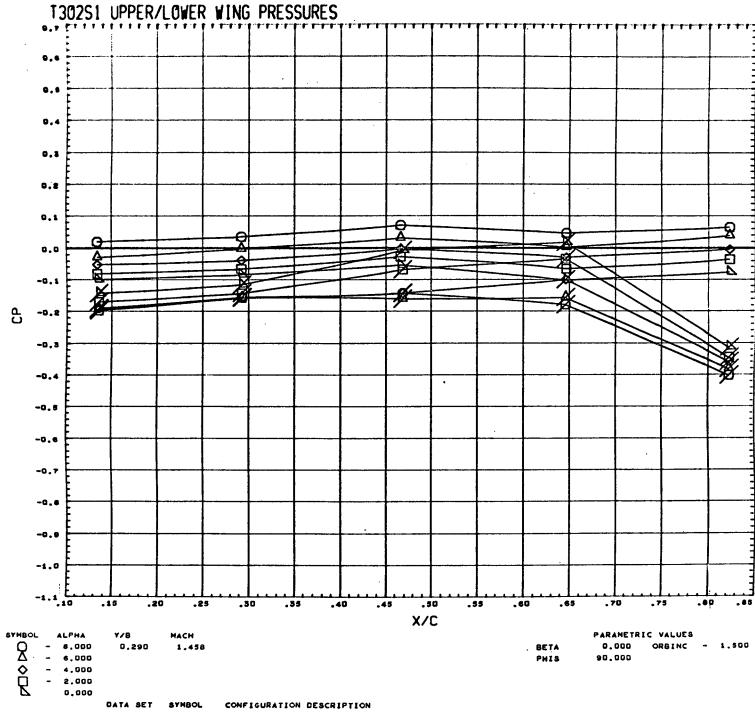


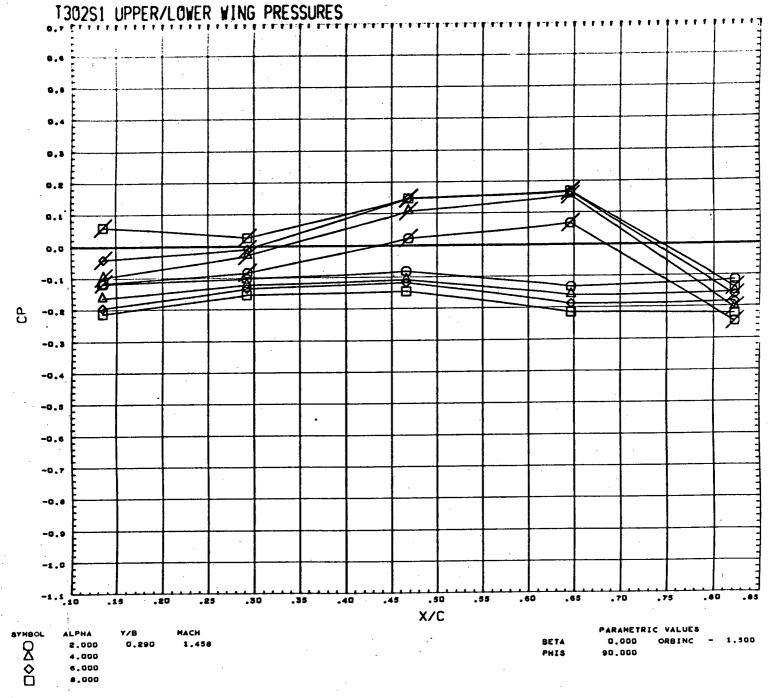


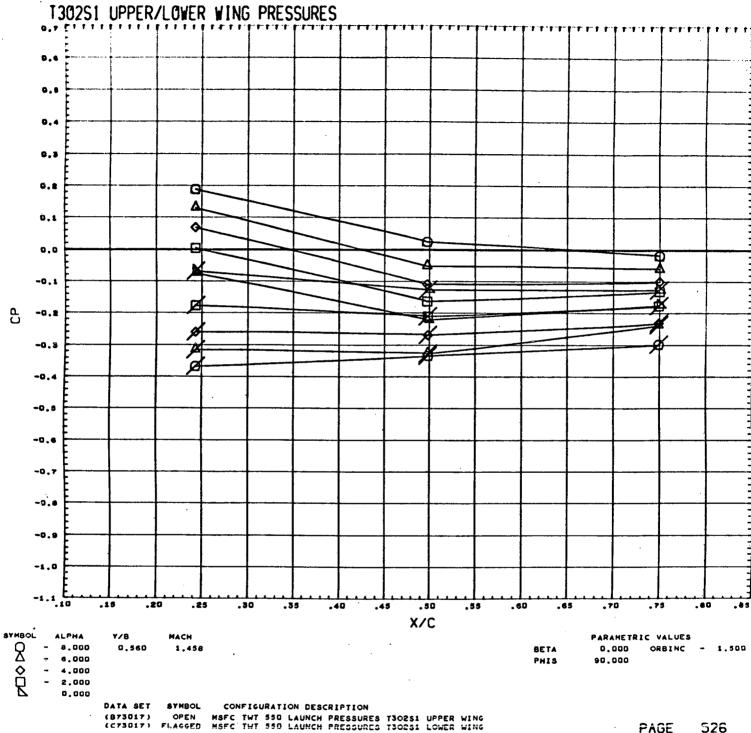
(873017) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING (C73017) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

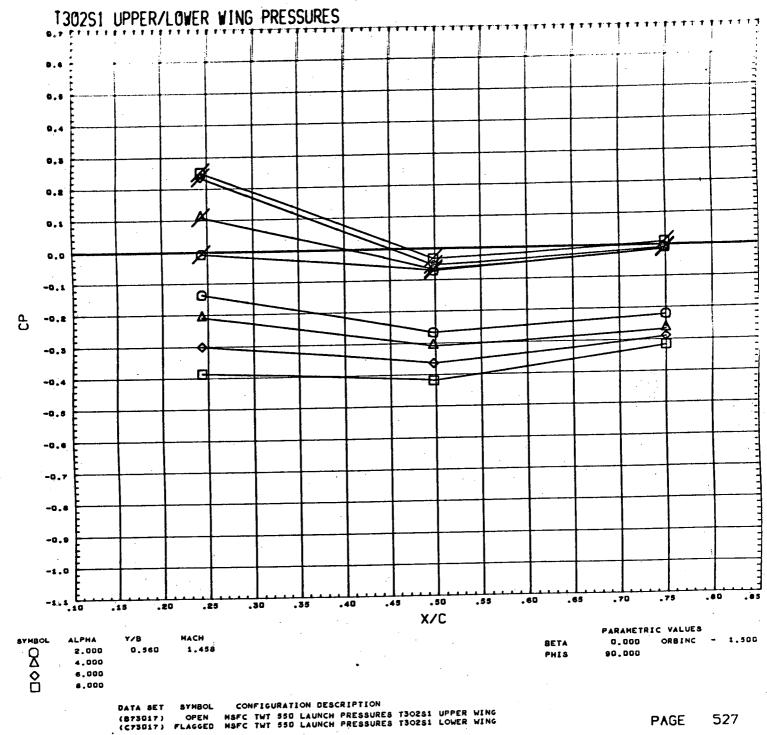


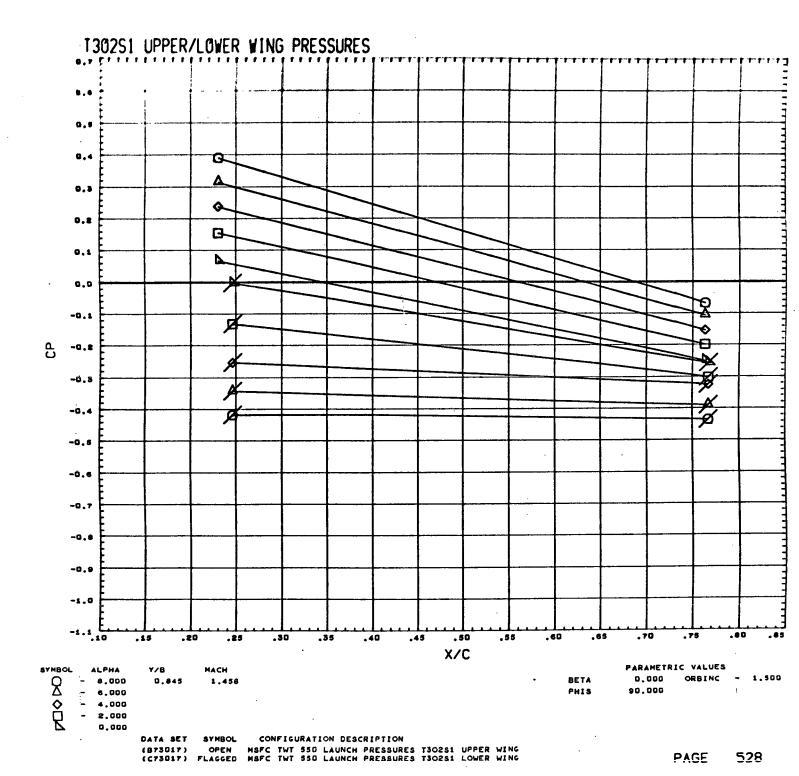


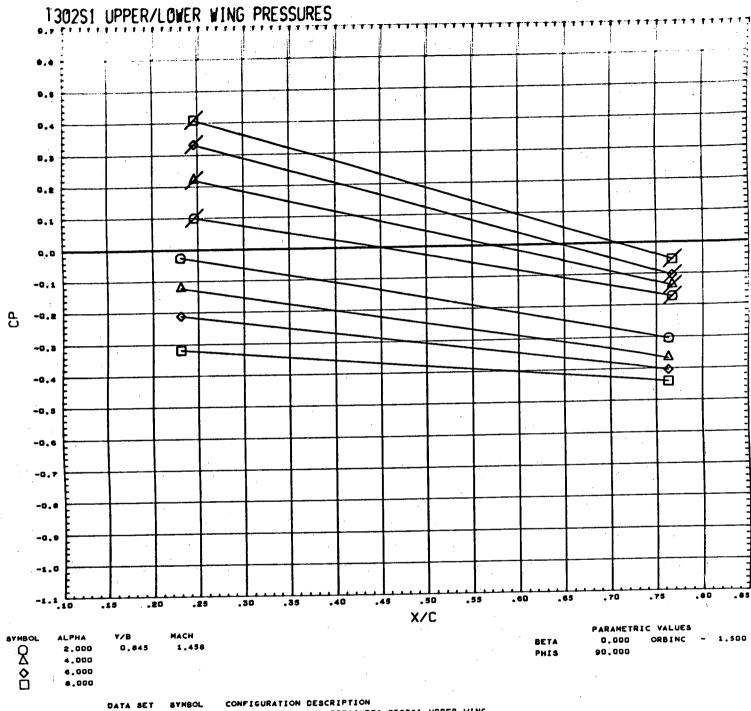


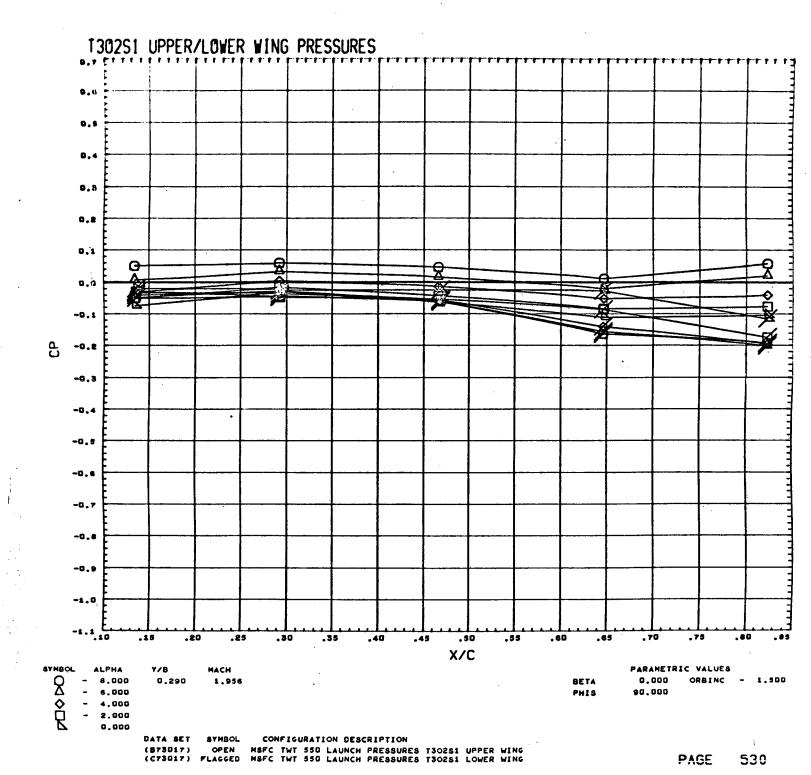


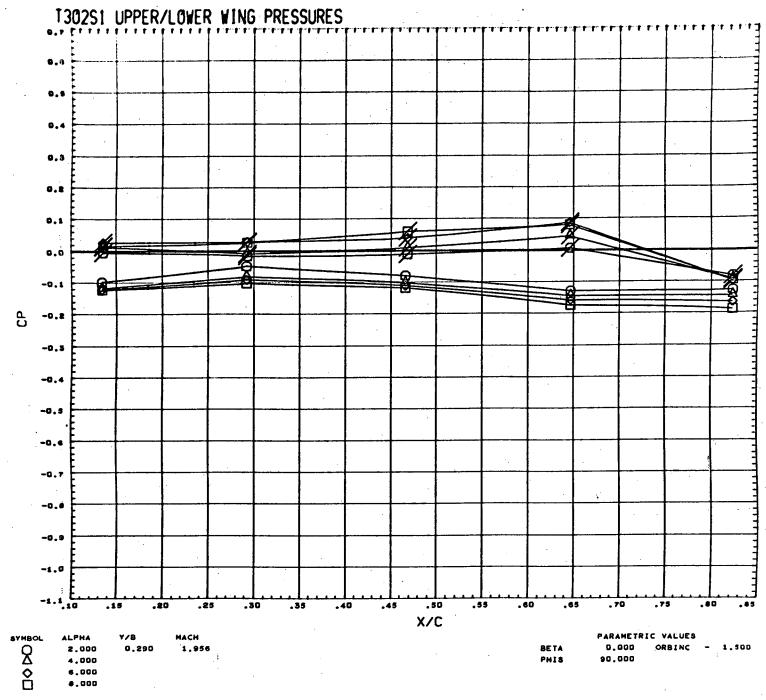


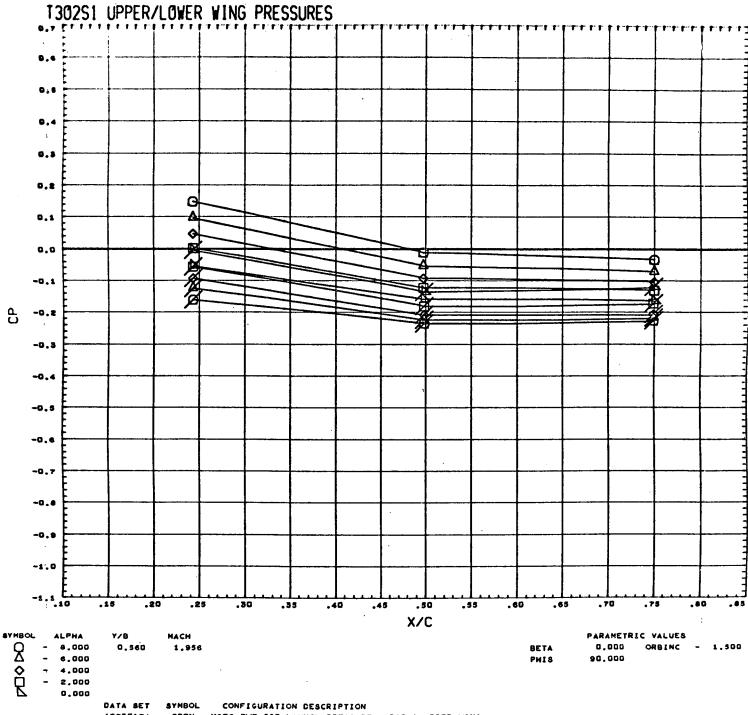


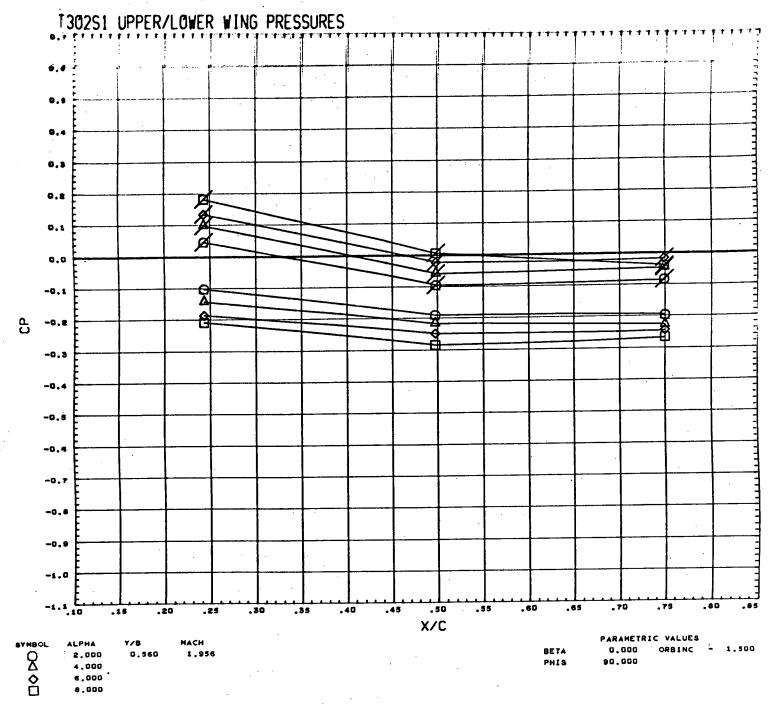


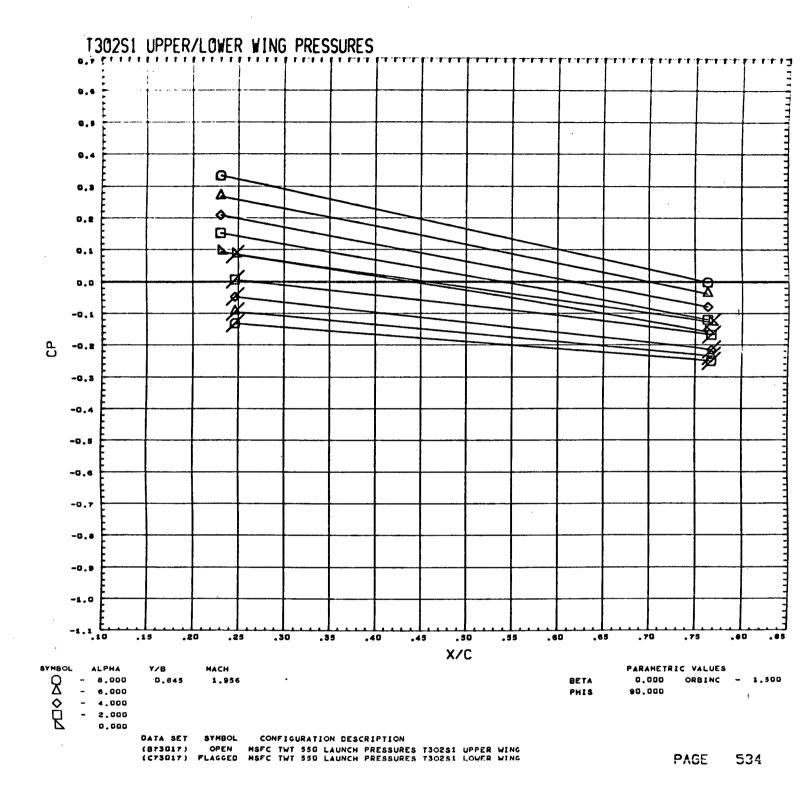


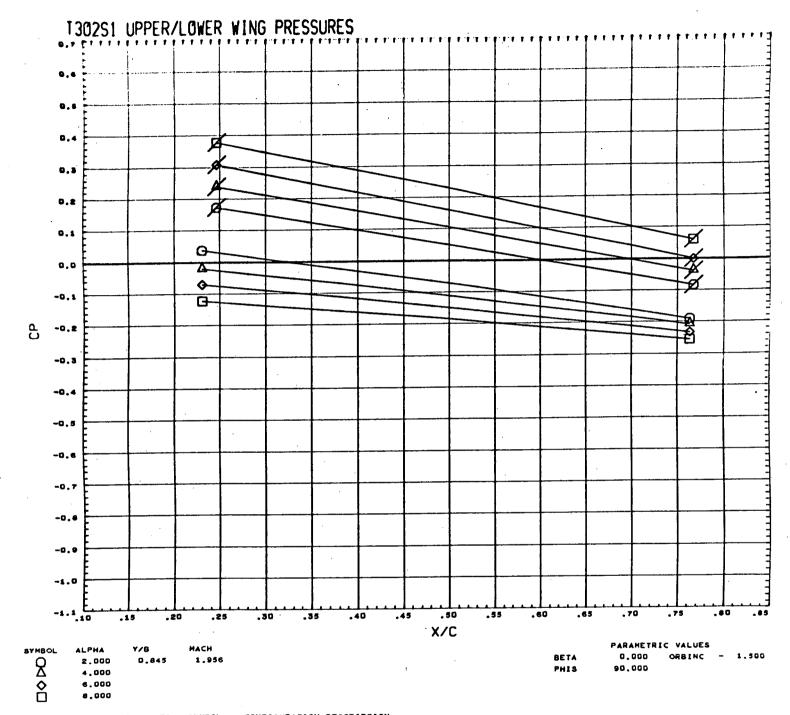


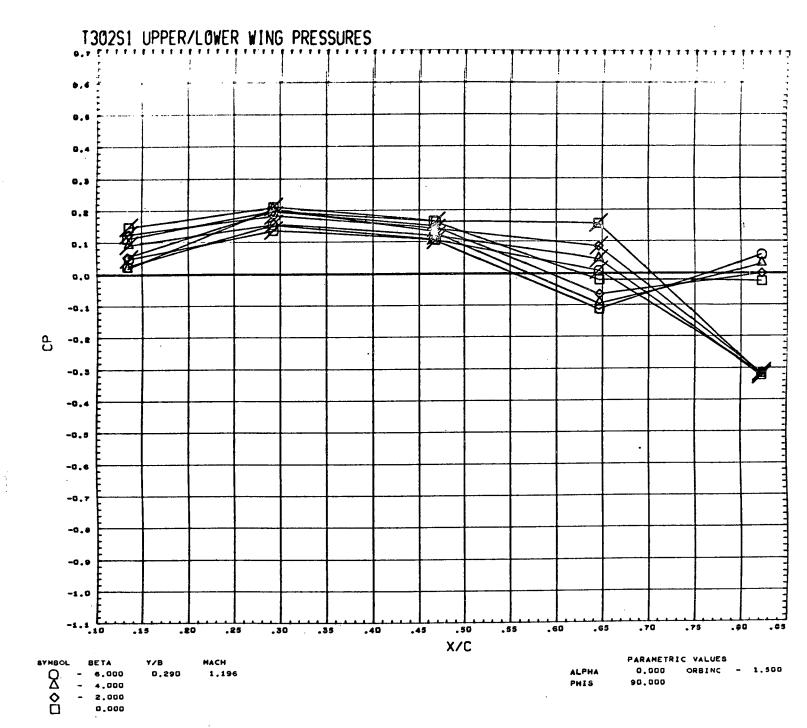


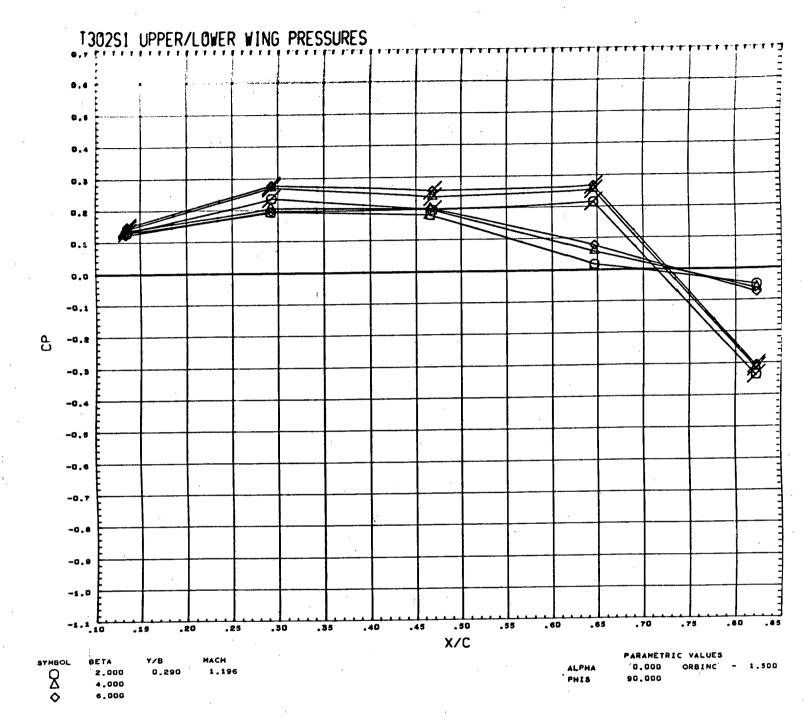


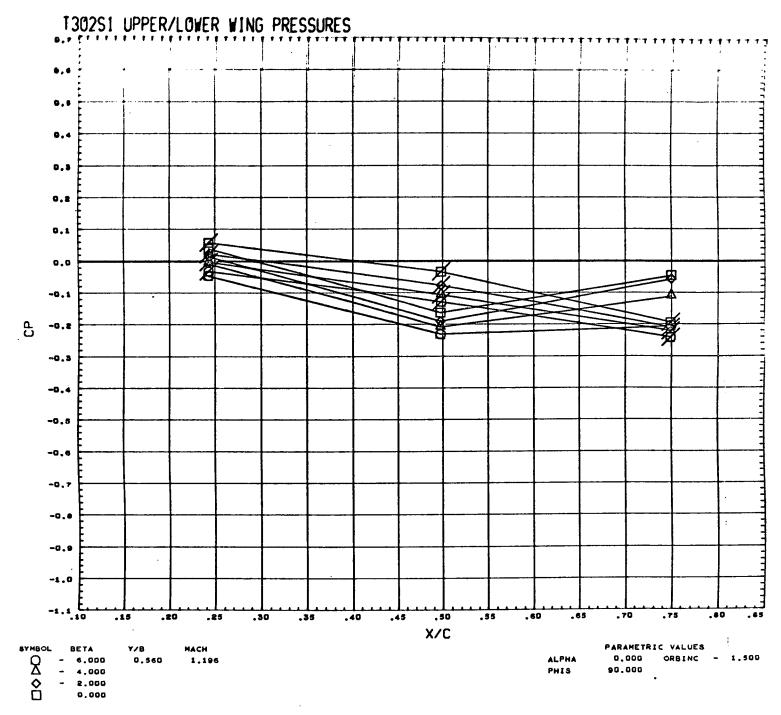


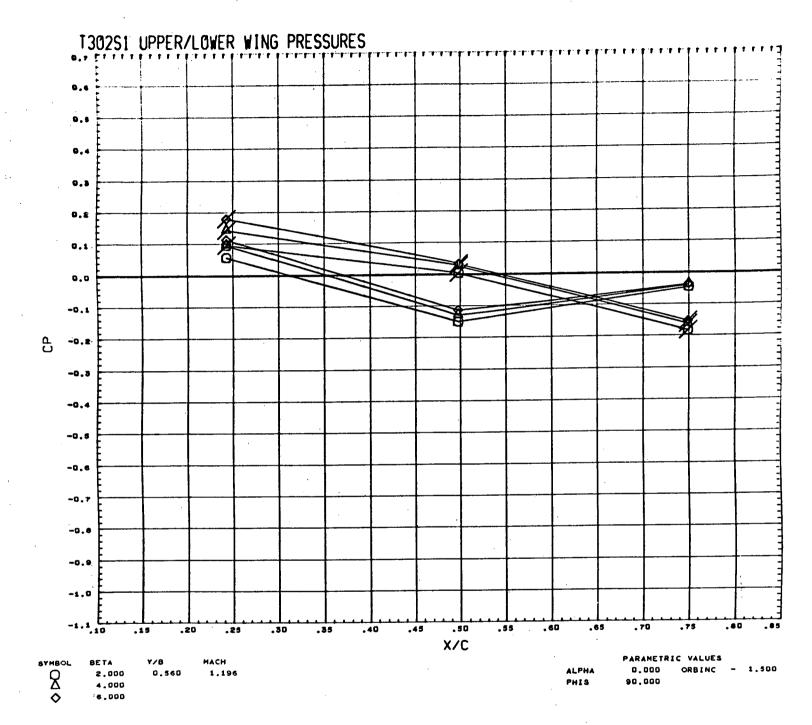


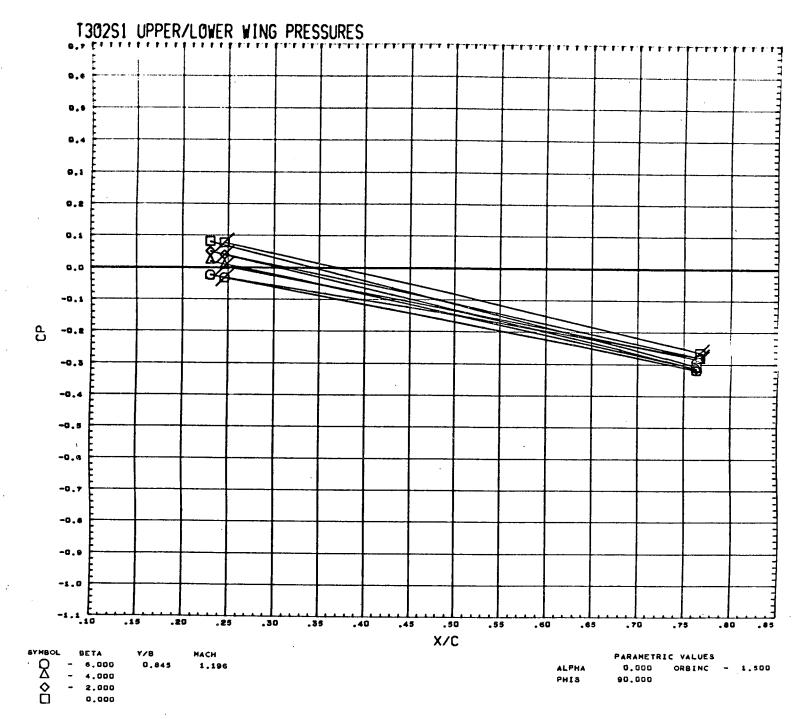


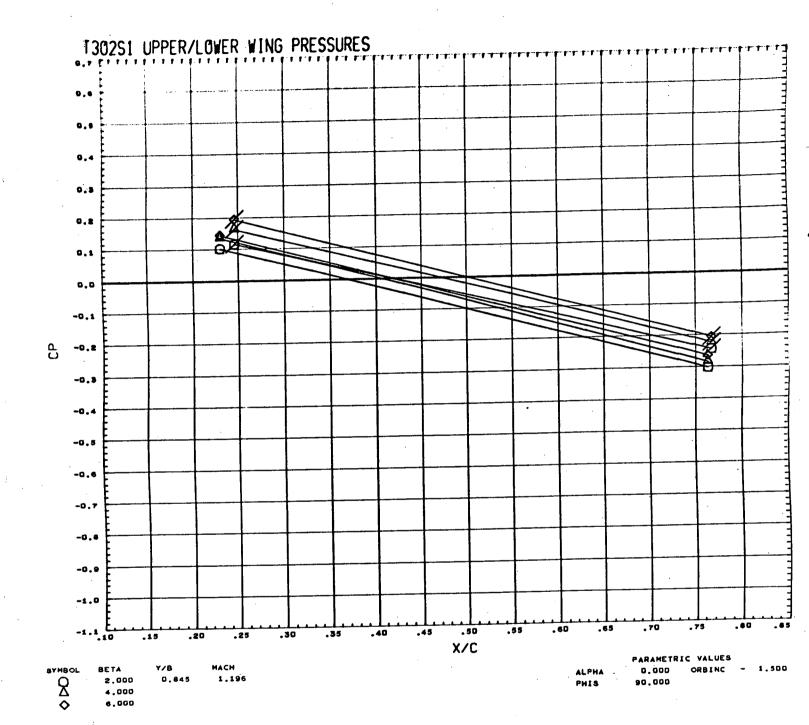


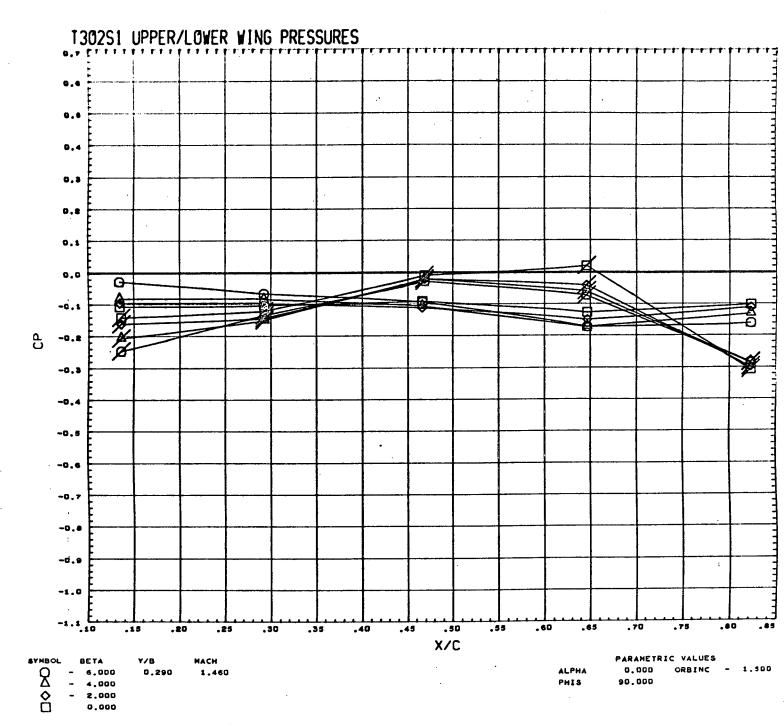


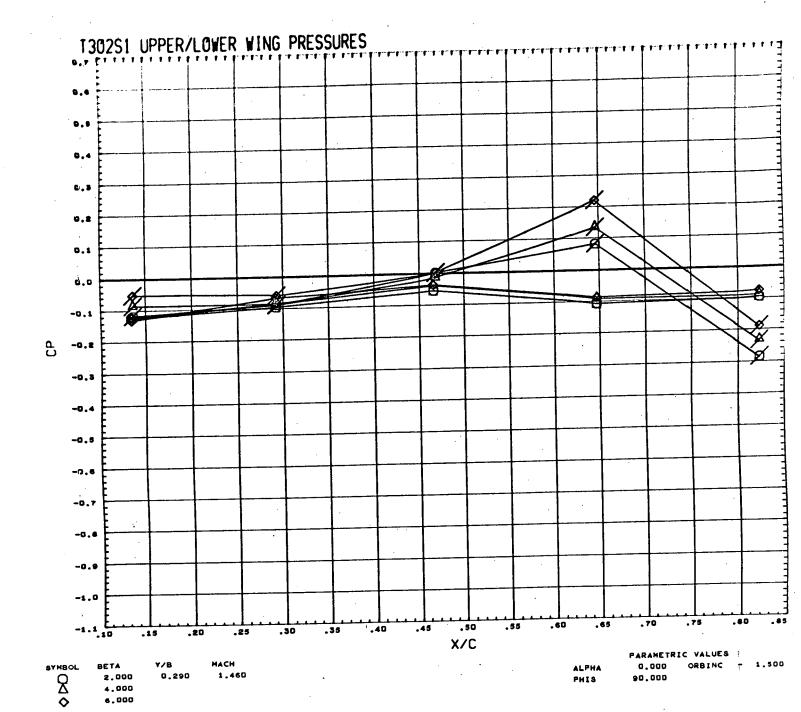


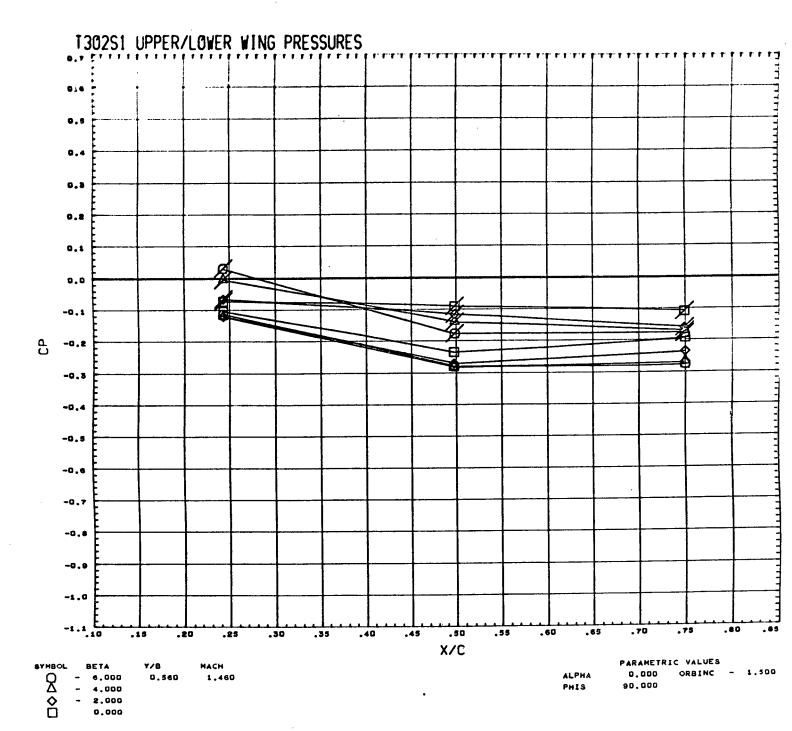


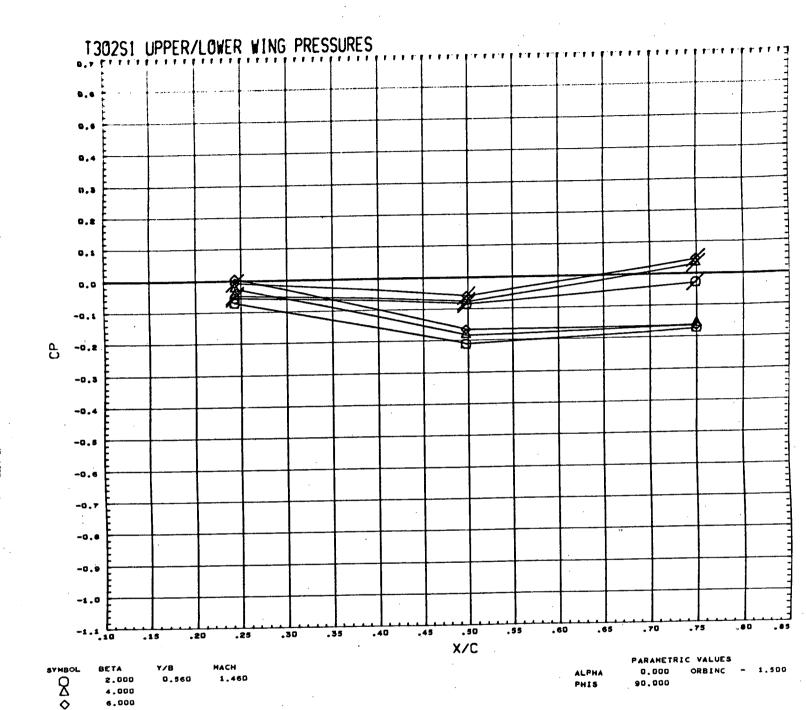




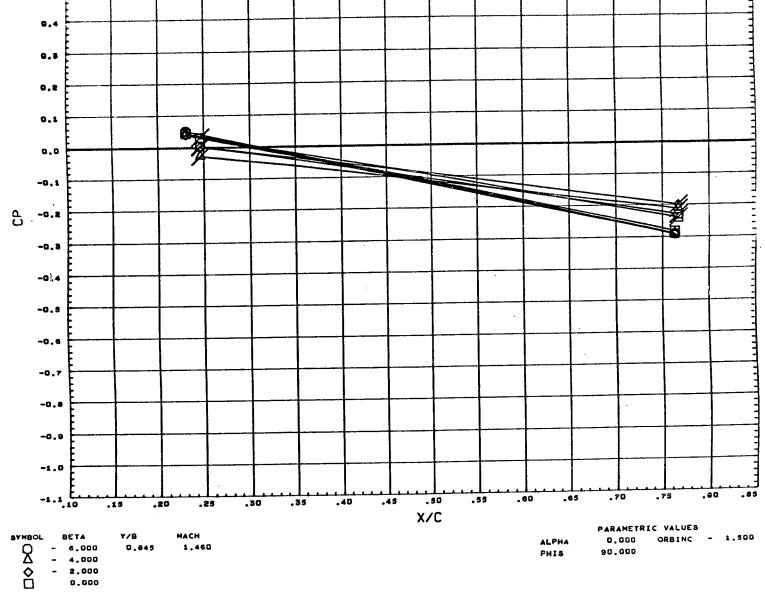




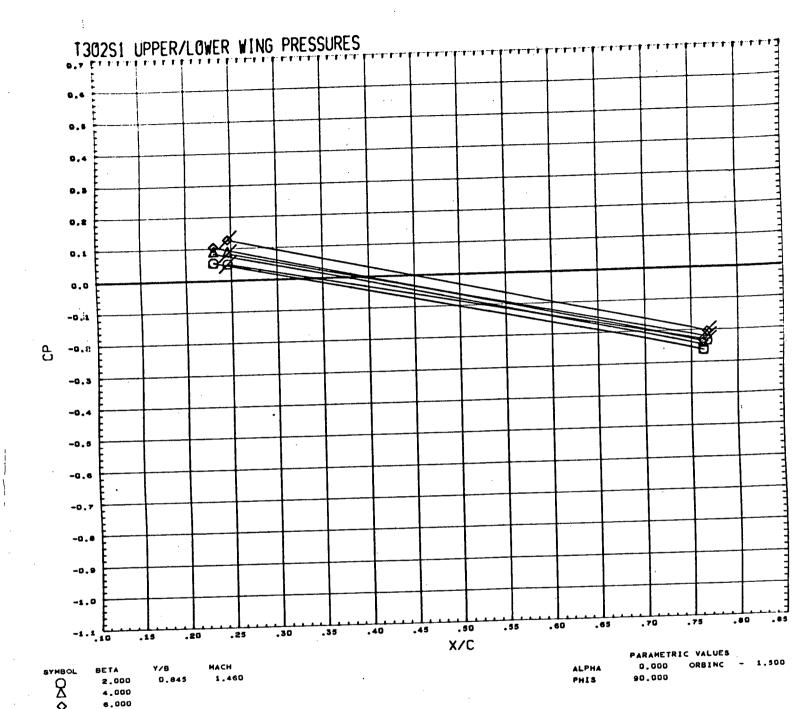


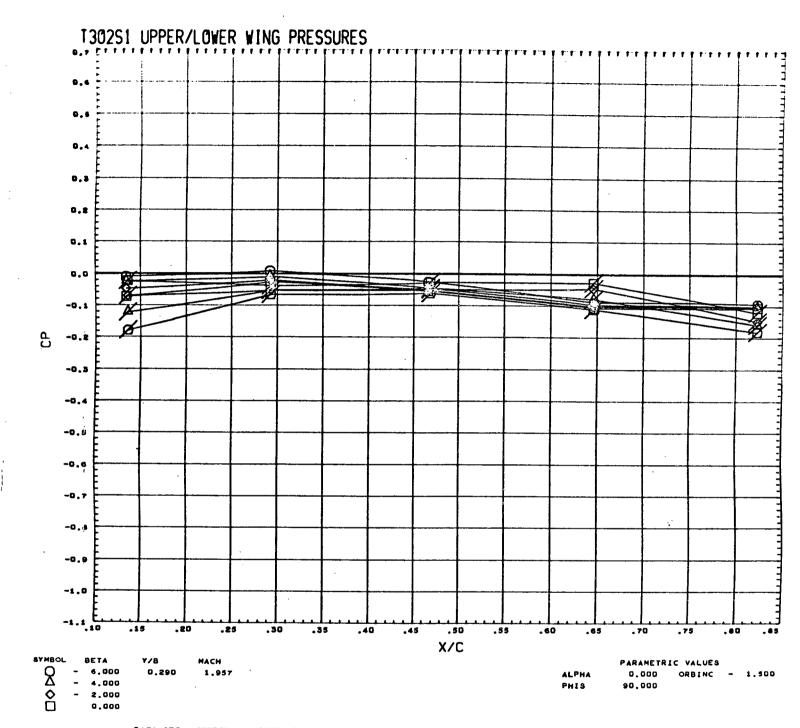


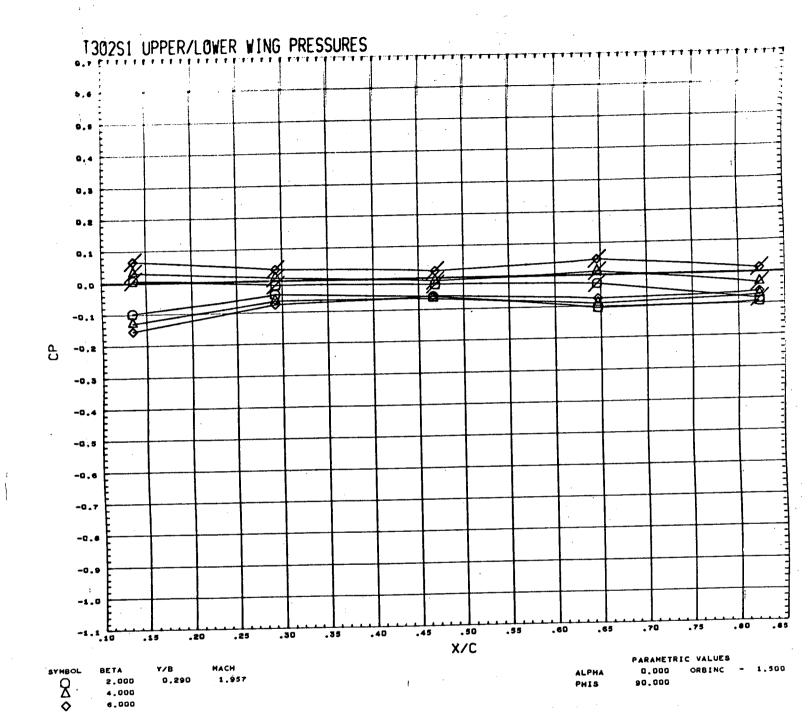
1302S1 UPPER/LOWER WING PRESSURES



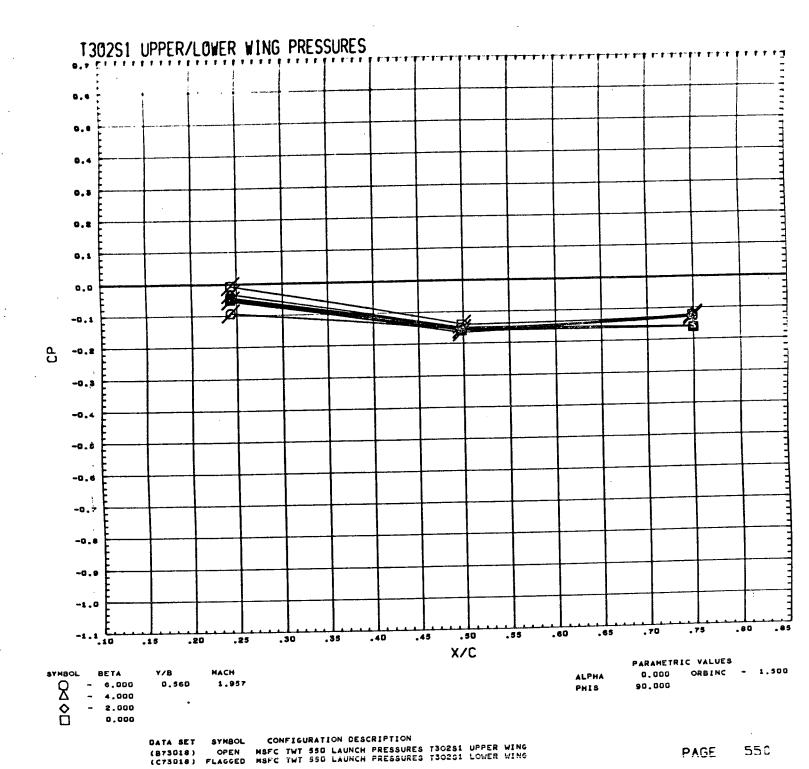
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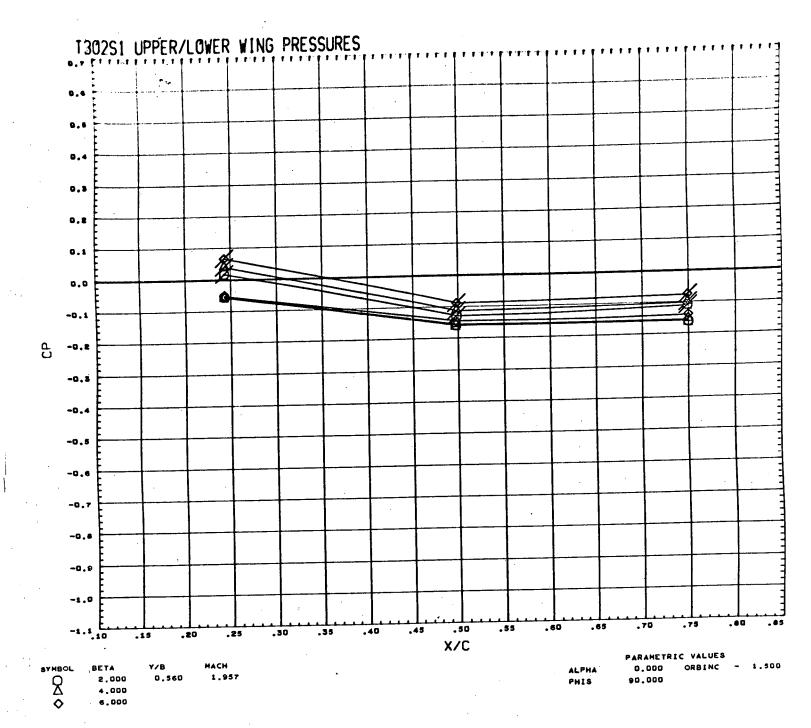


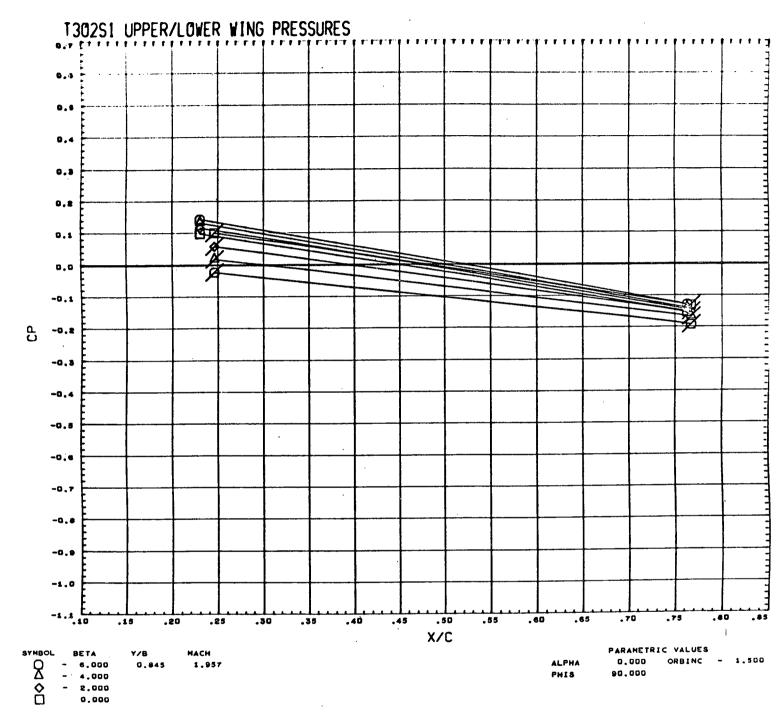


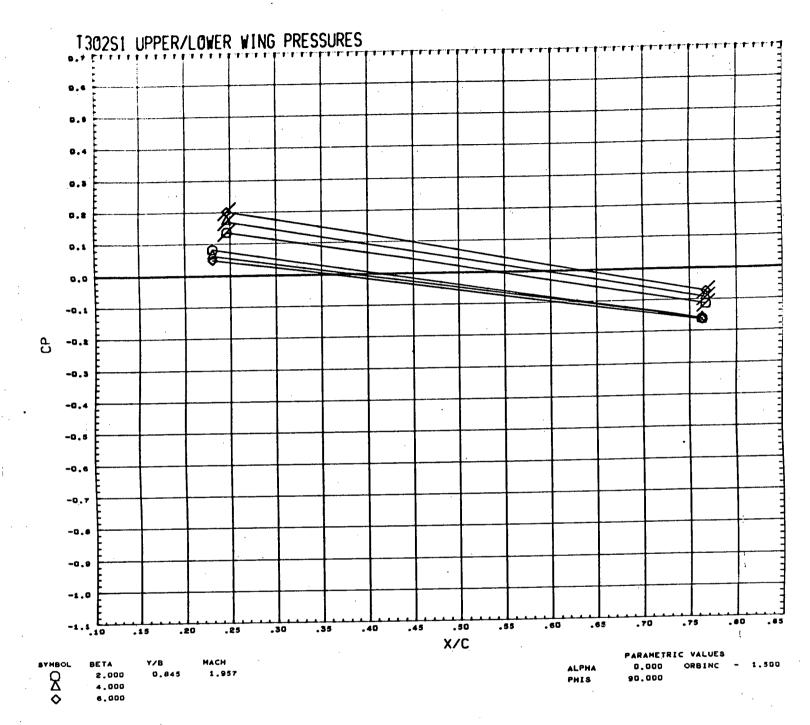


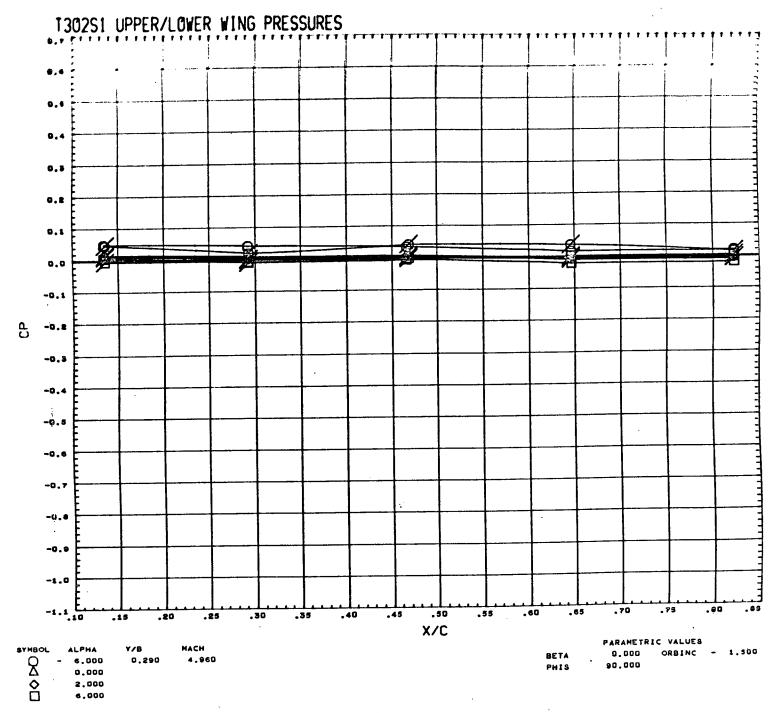
PAGE . 549

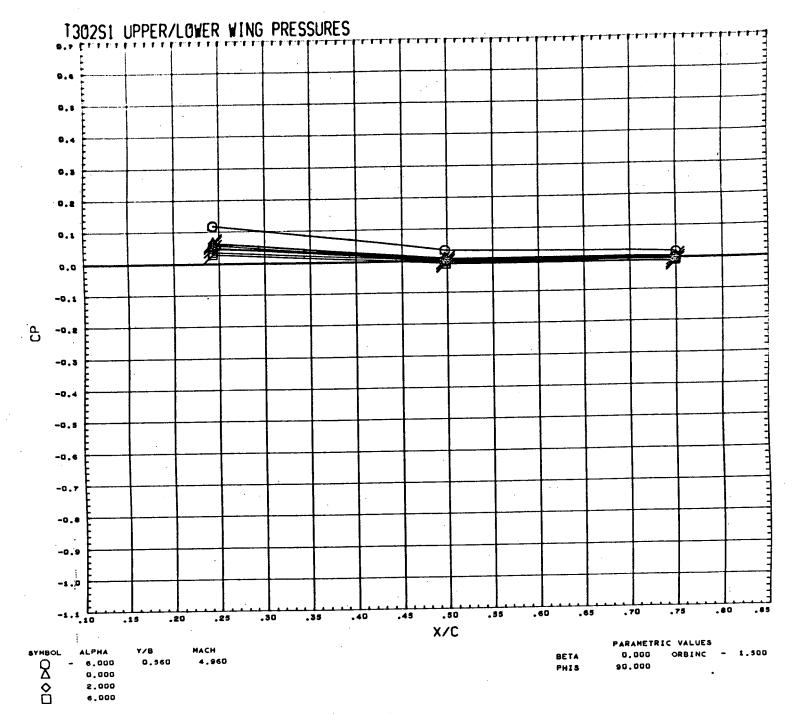






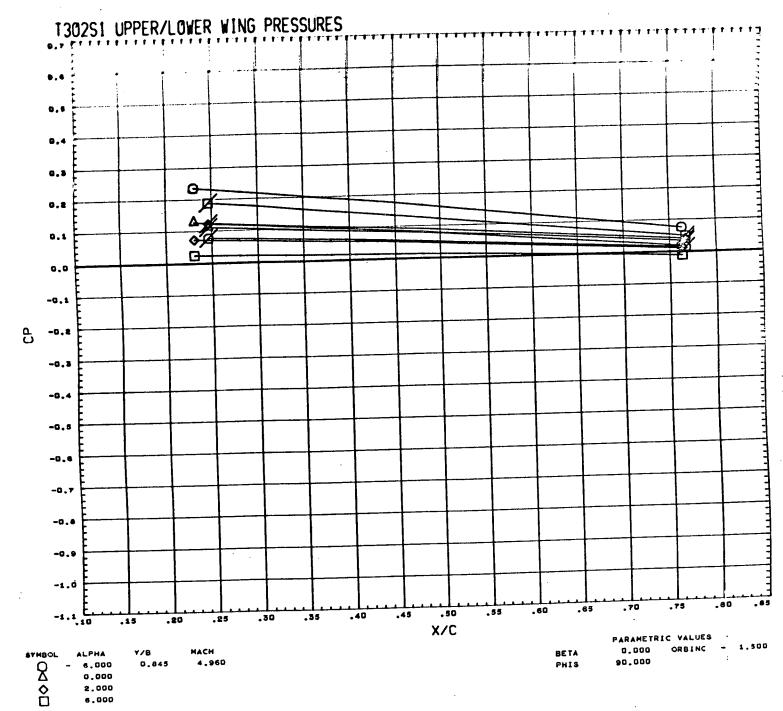


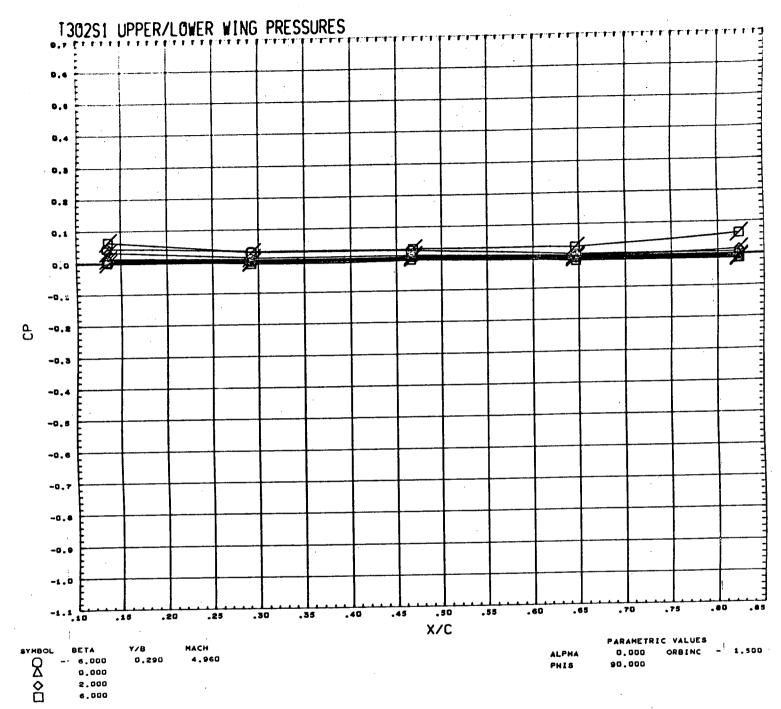


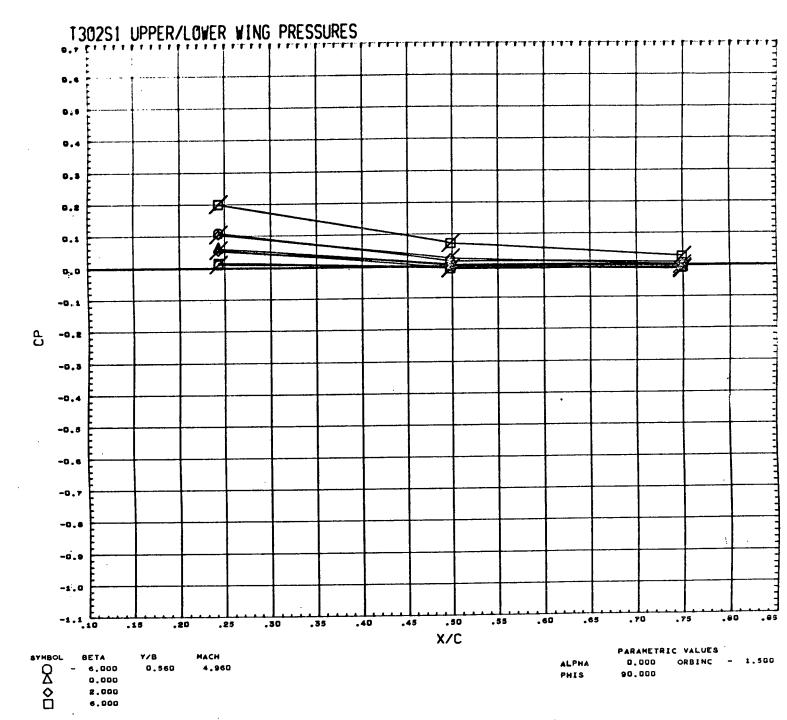


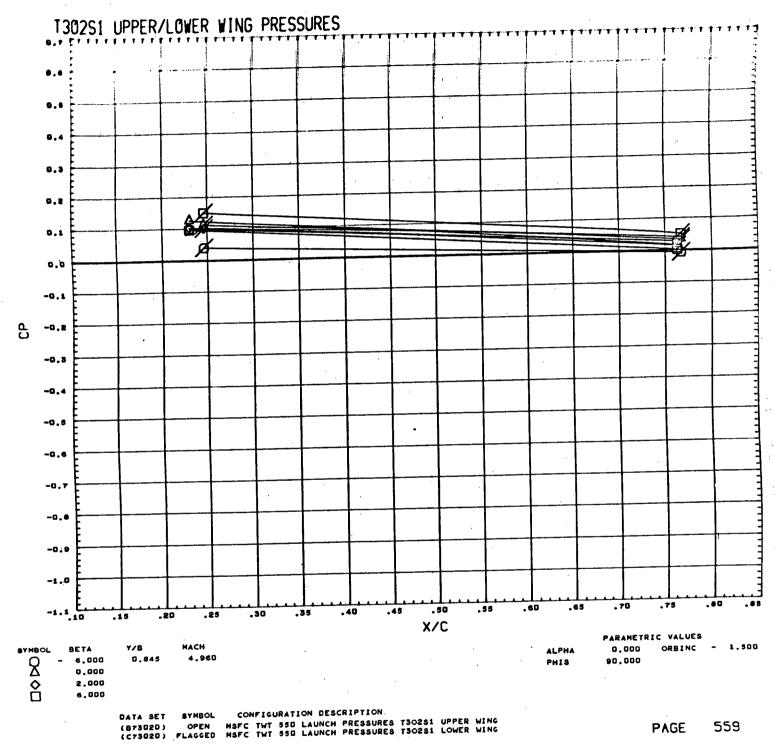
PAGE 555

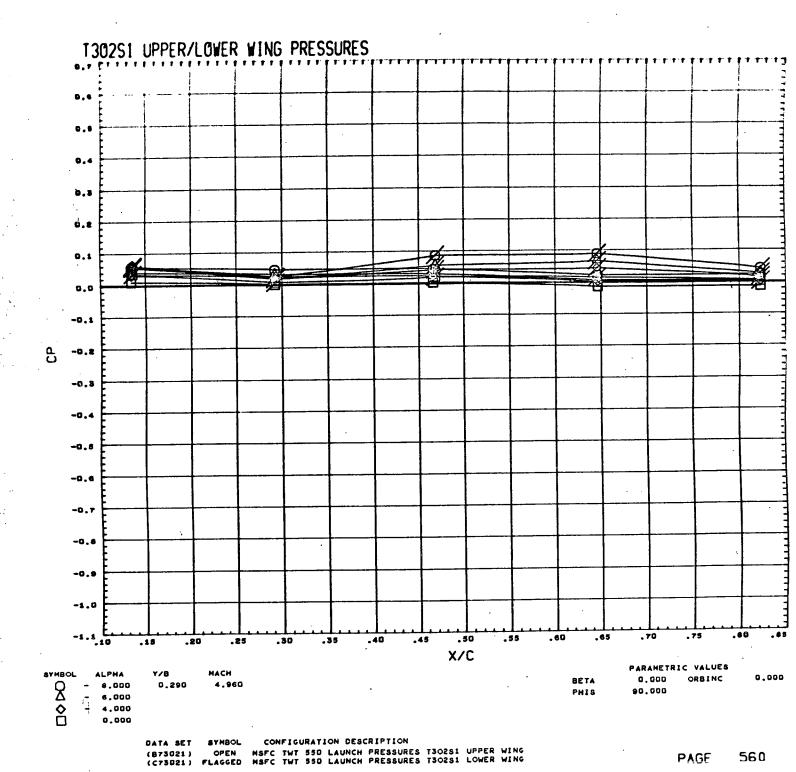
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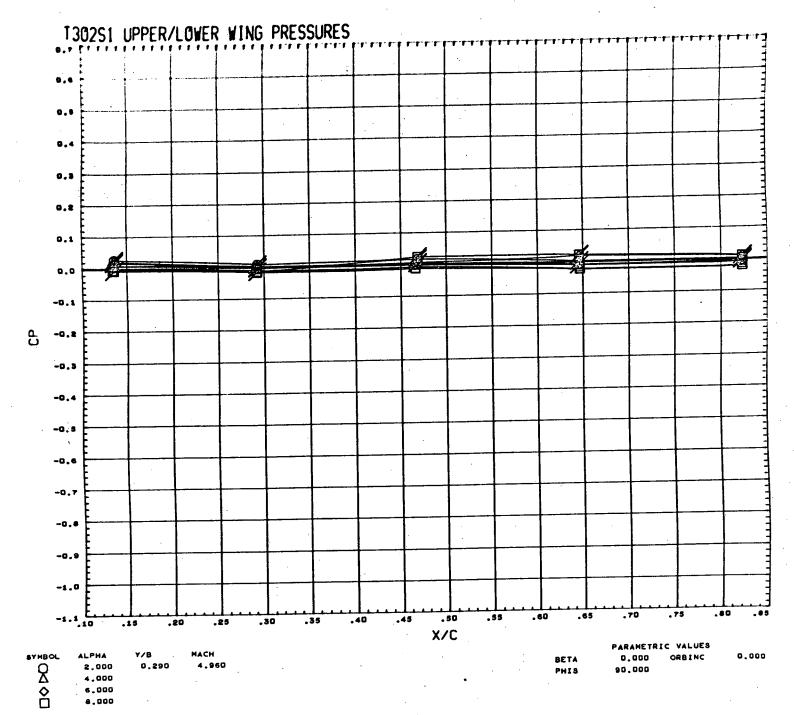


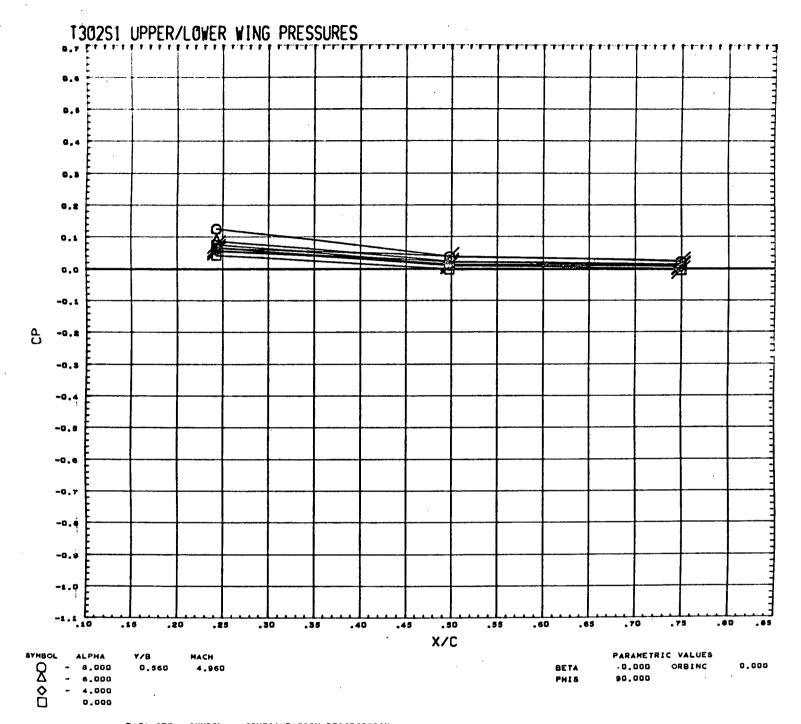


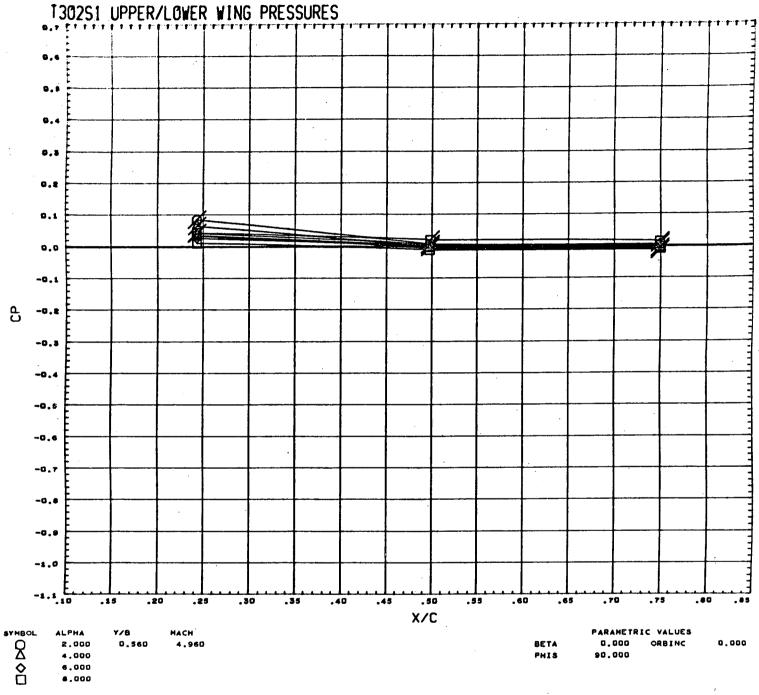


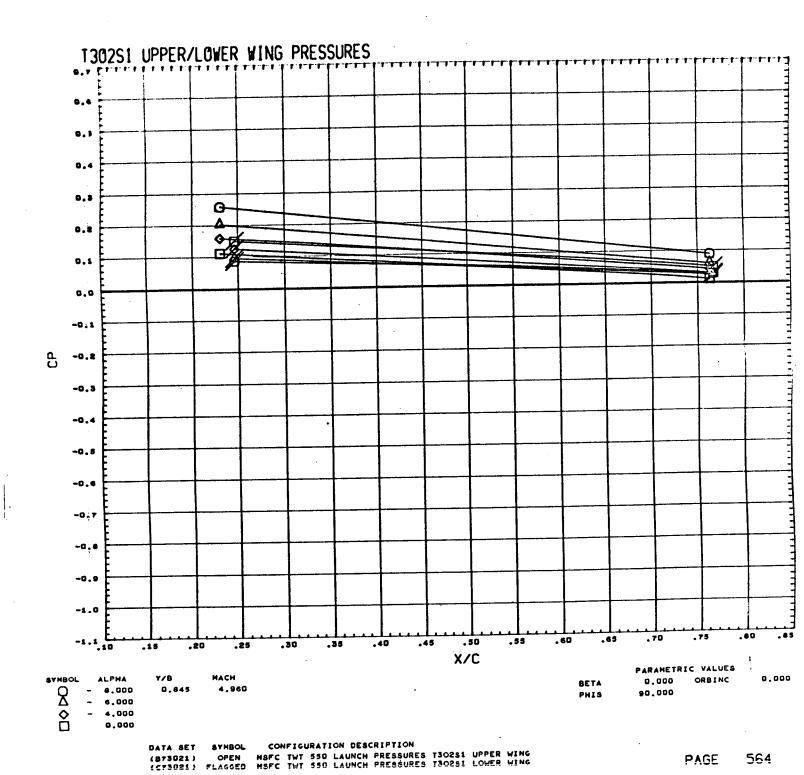




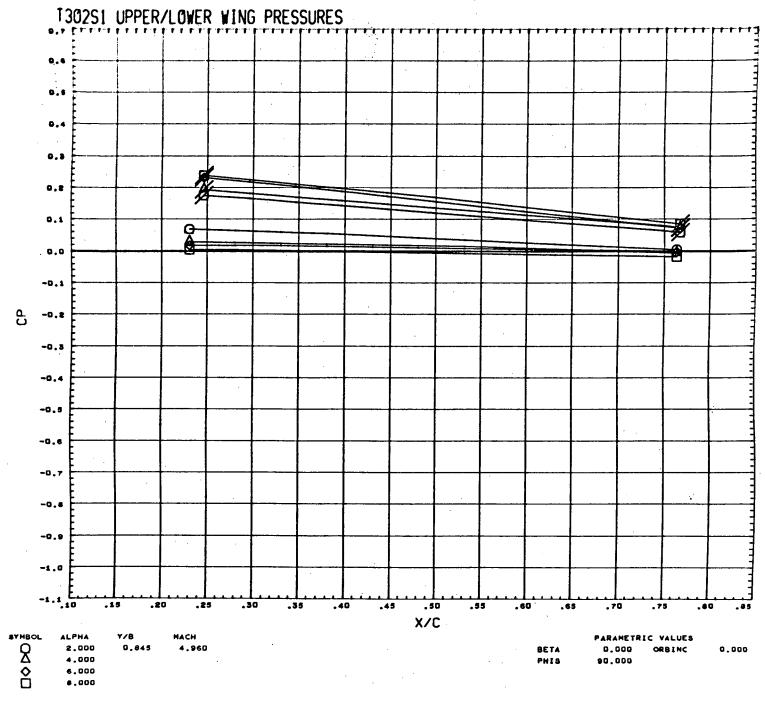


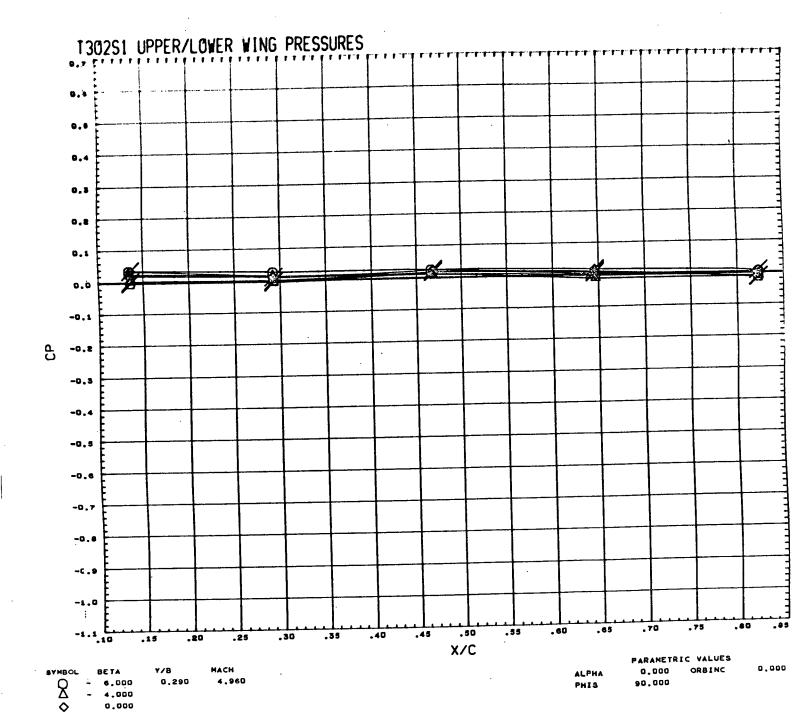




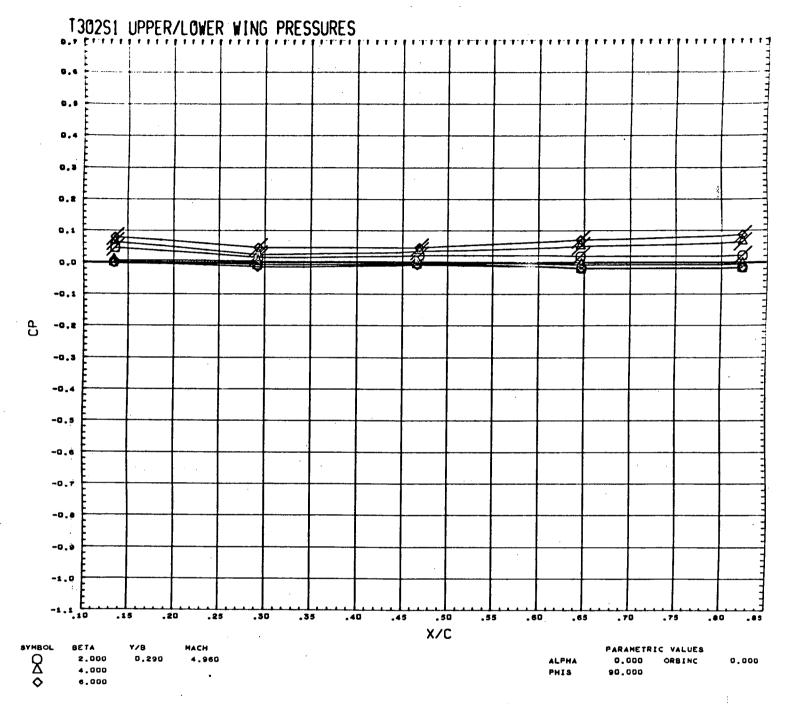


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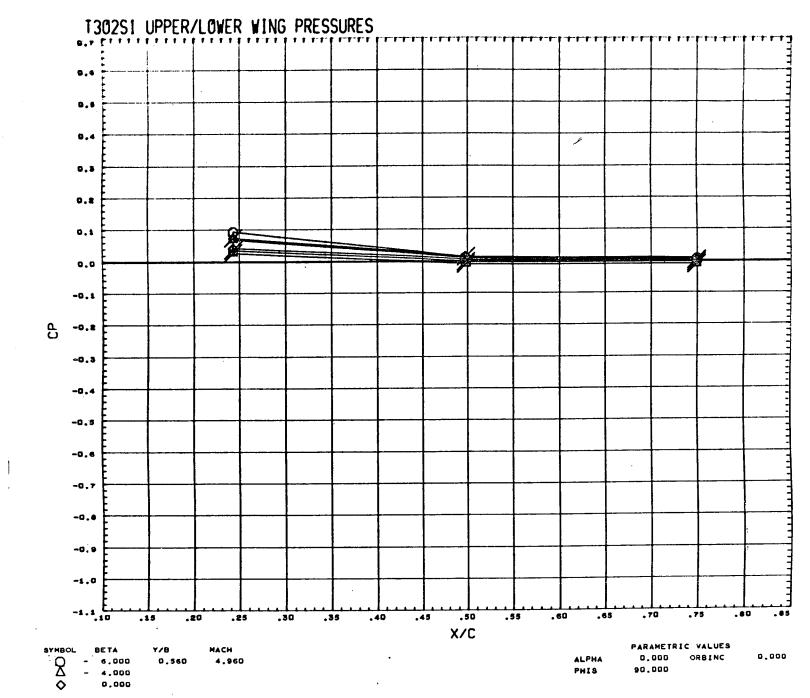


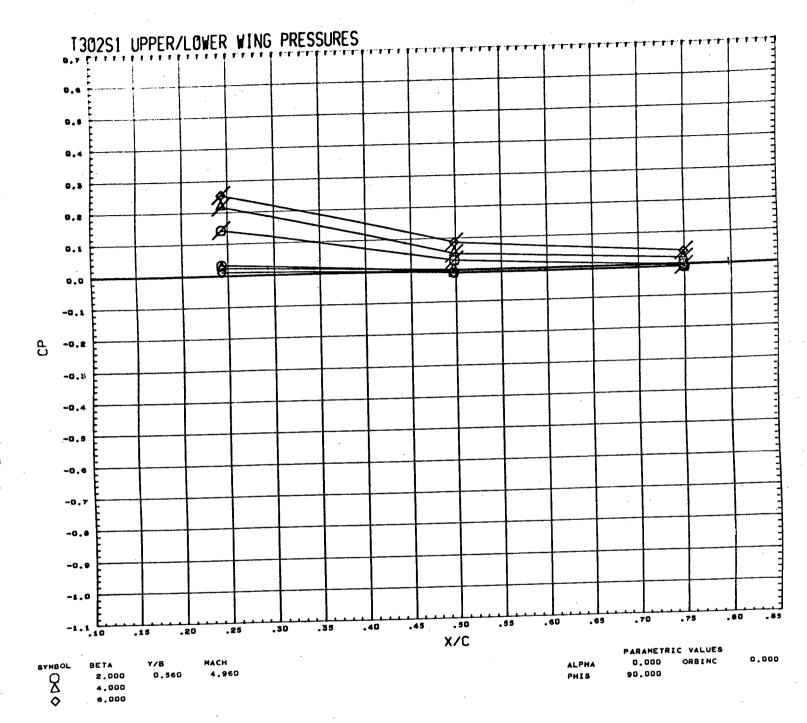


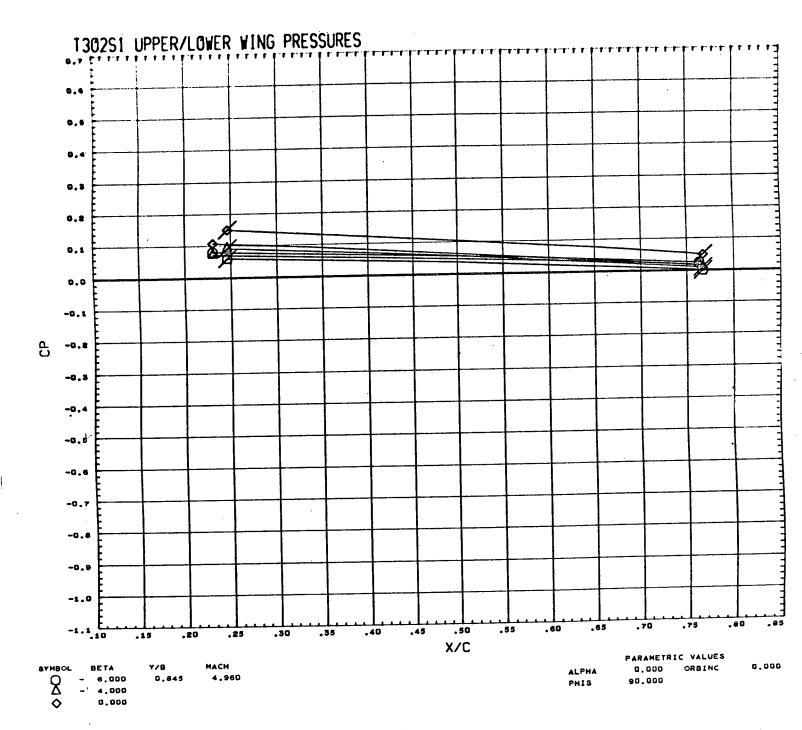
PAGE 566 -

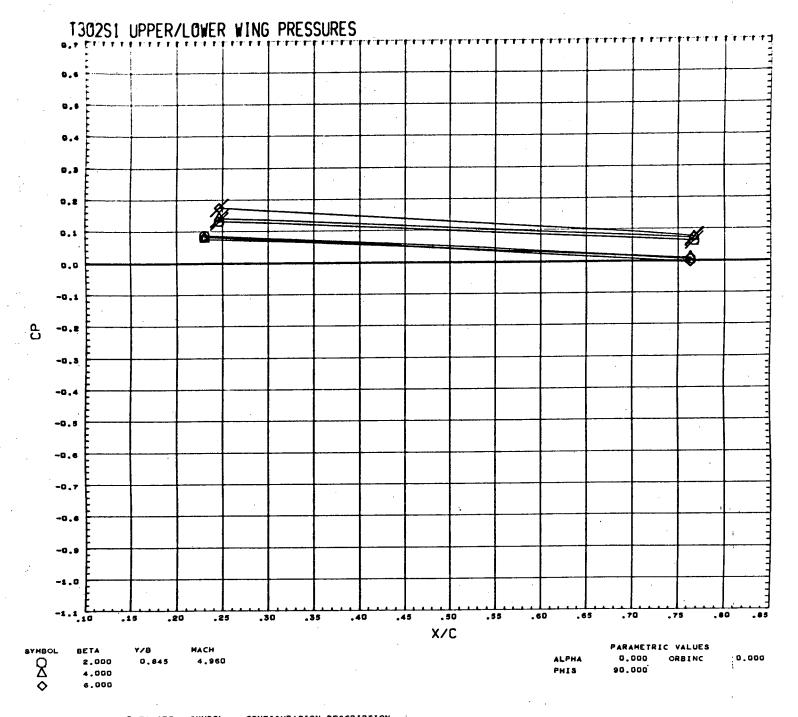


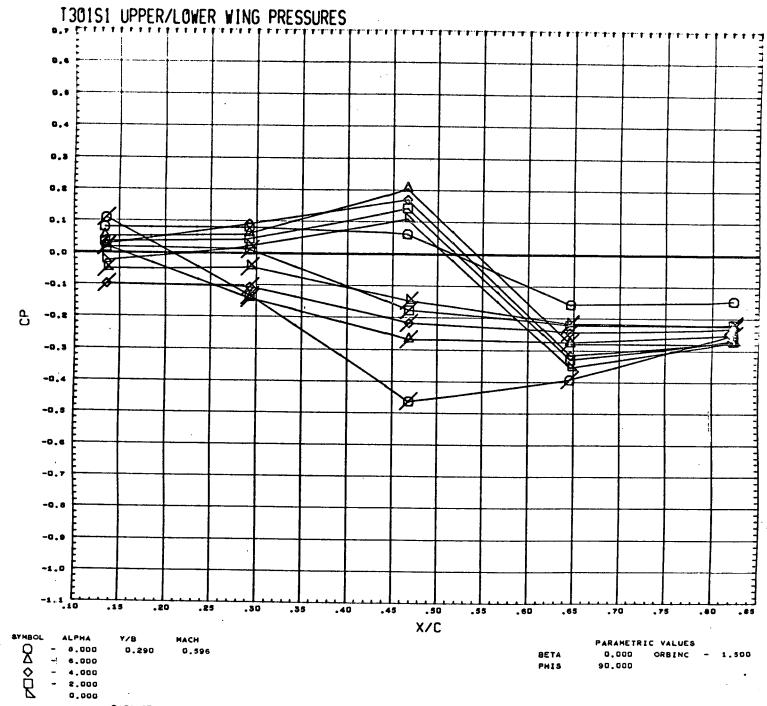


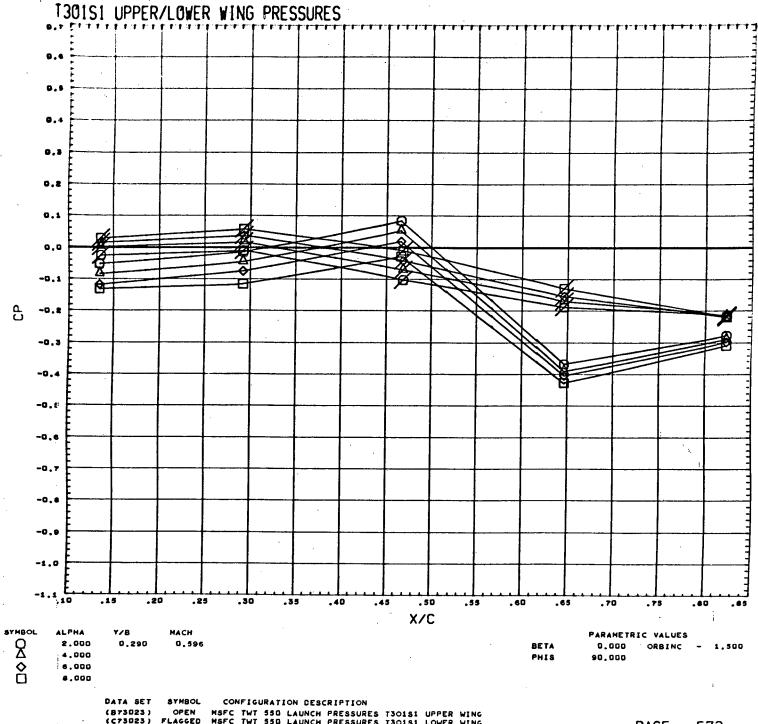




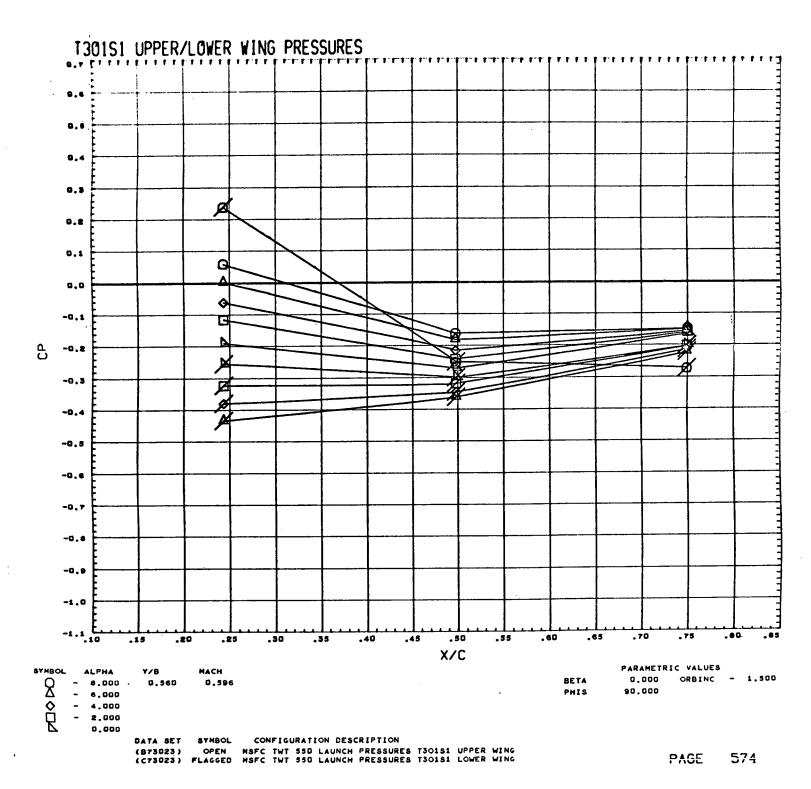


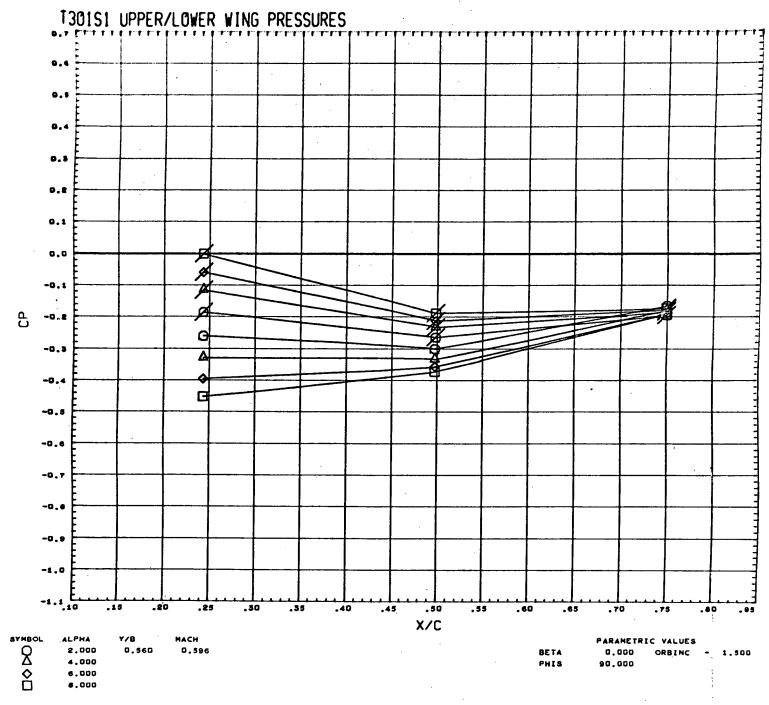


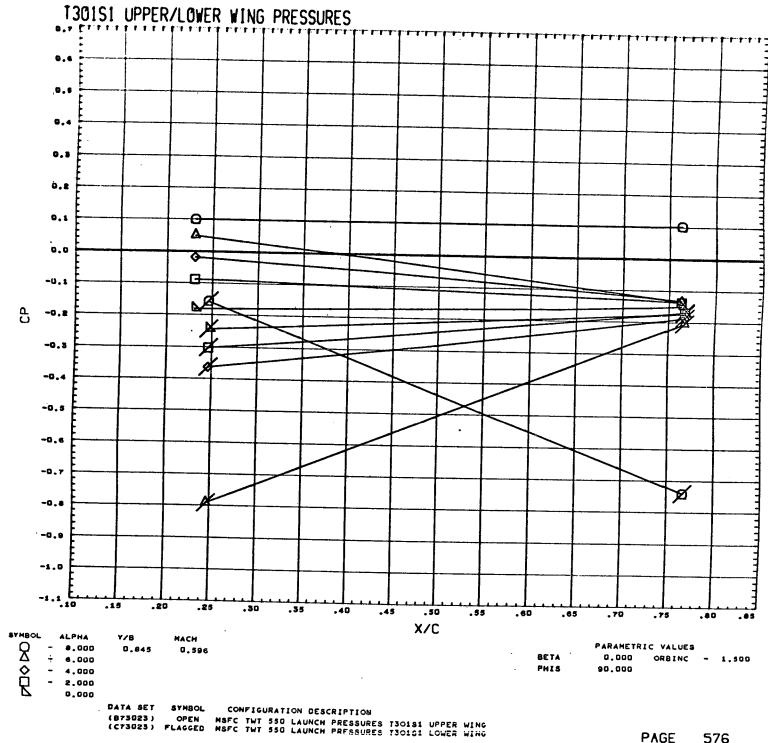


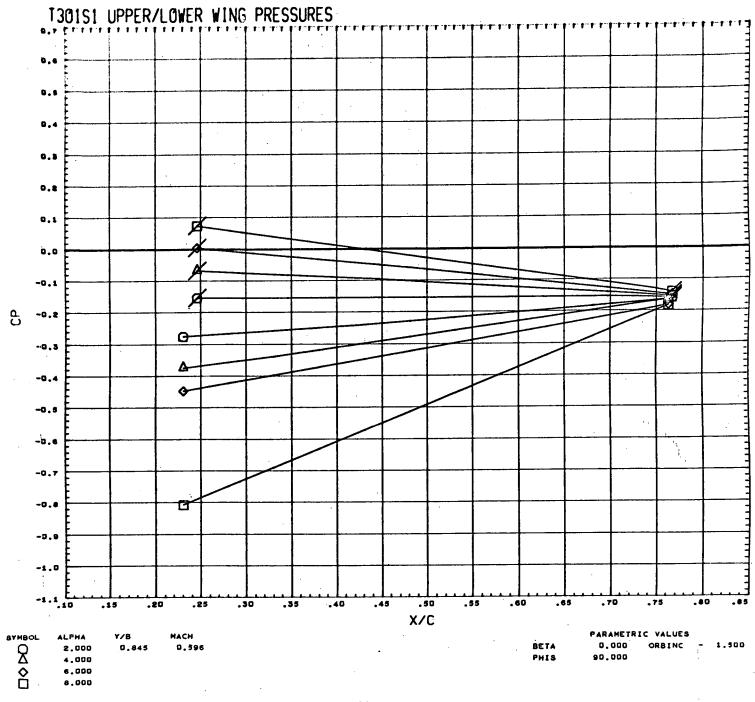


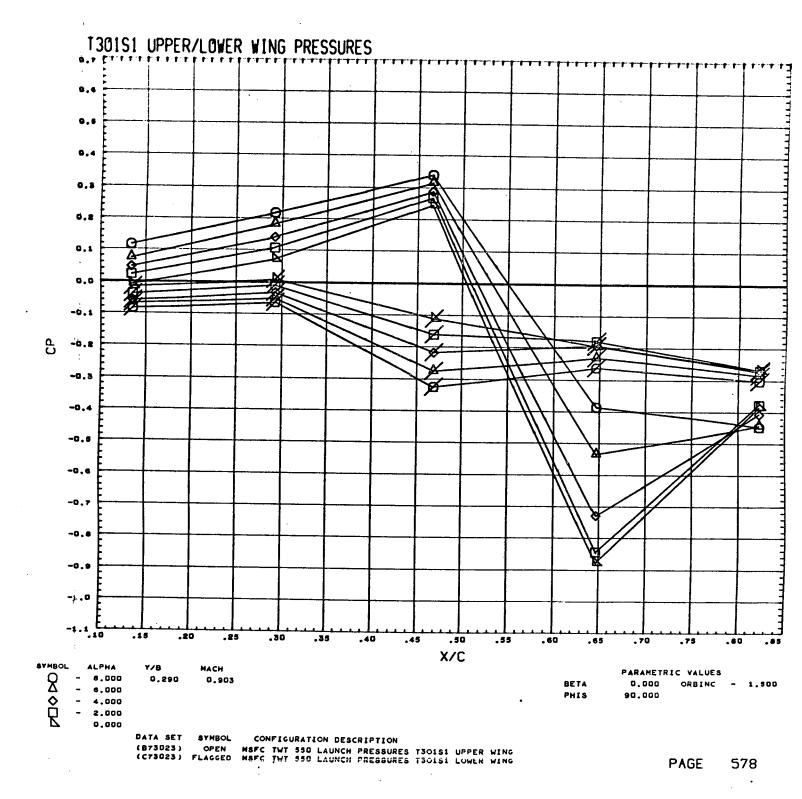
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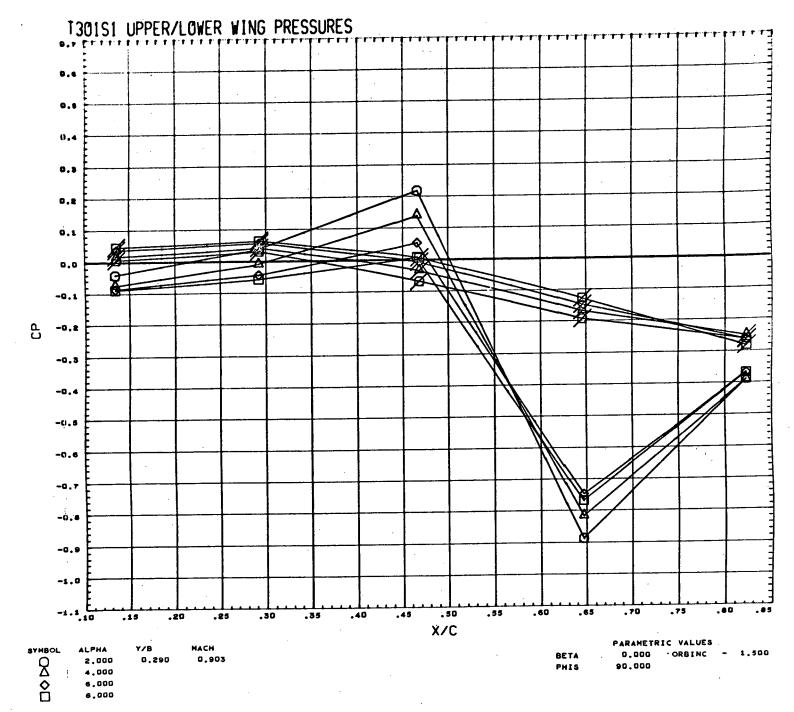


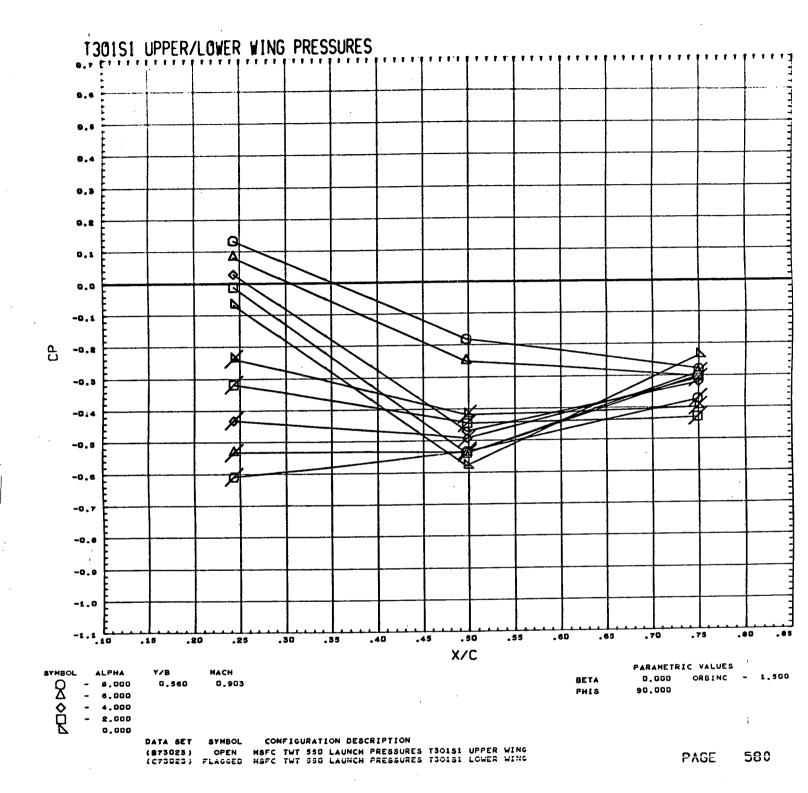


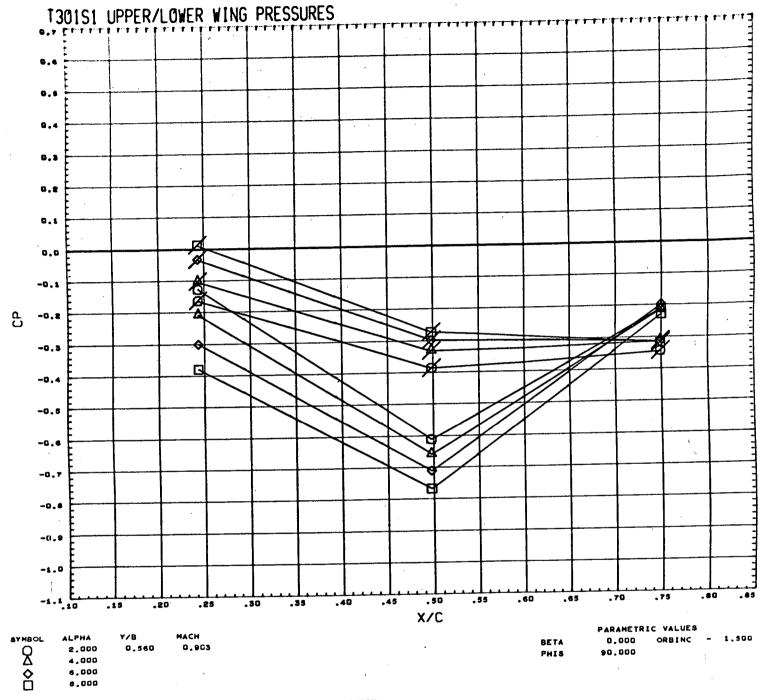






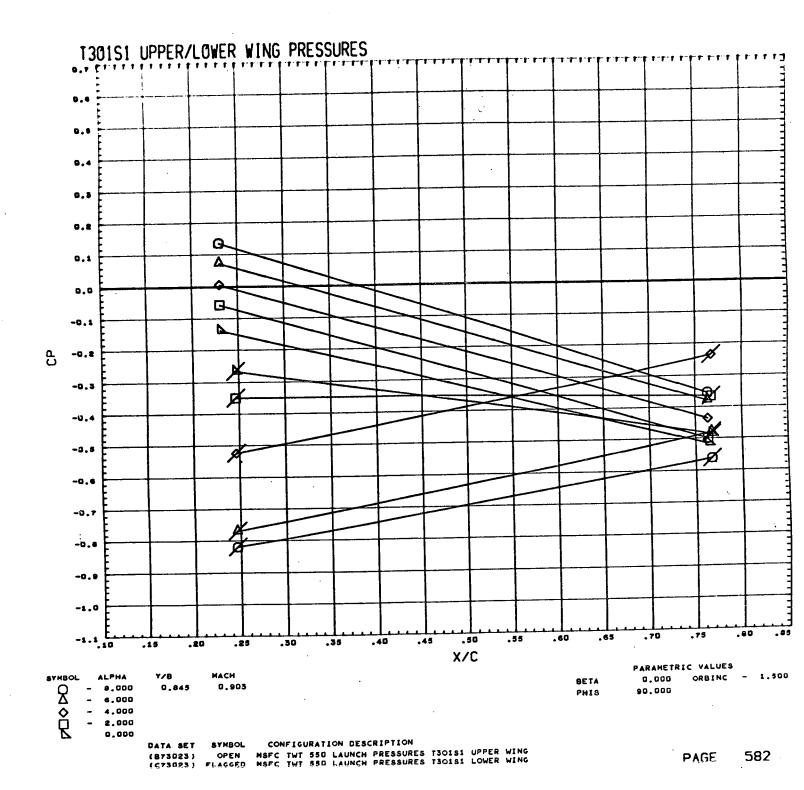


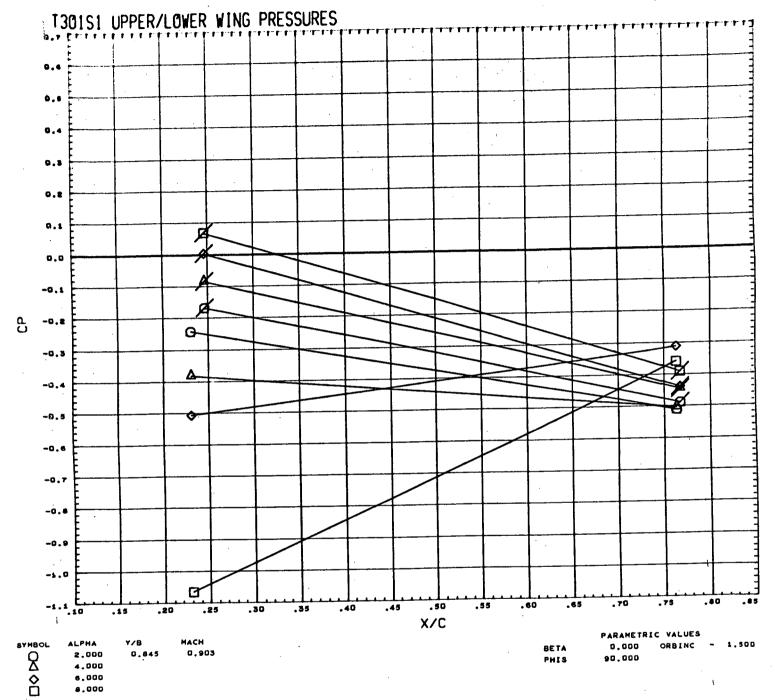




DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873023) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING





DATA SET SYMBOL CONFIGURATION DESCRIPTION

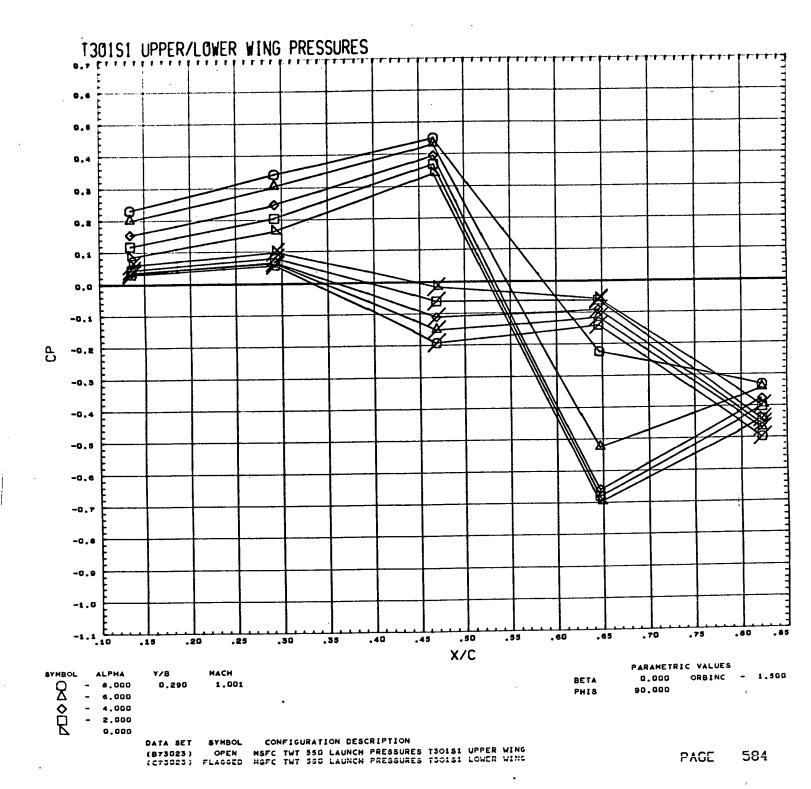
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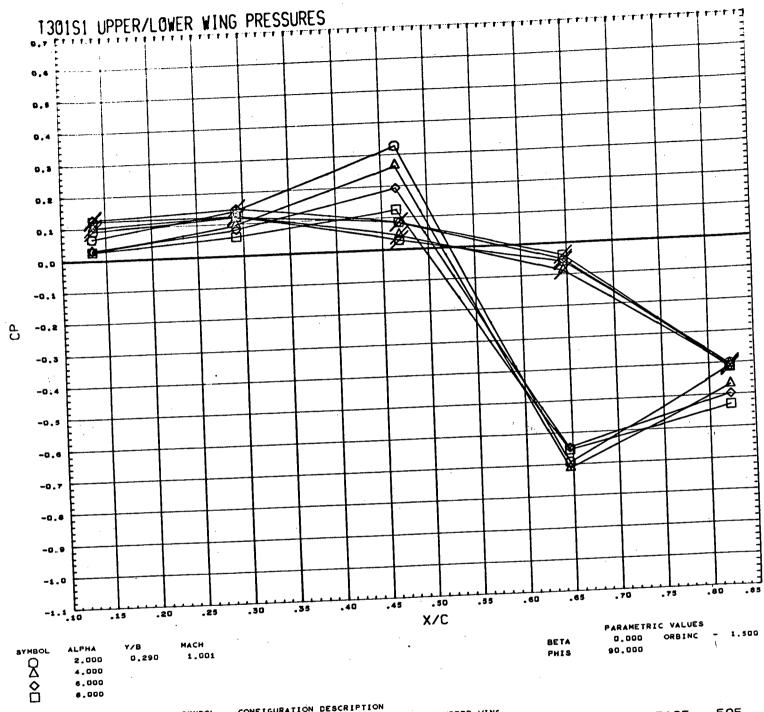
(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

PAGE

583

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DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873023) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING
(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

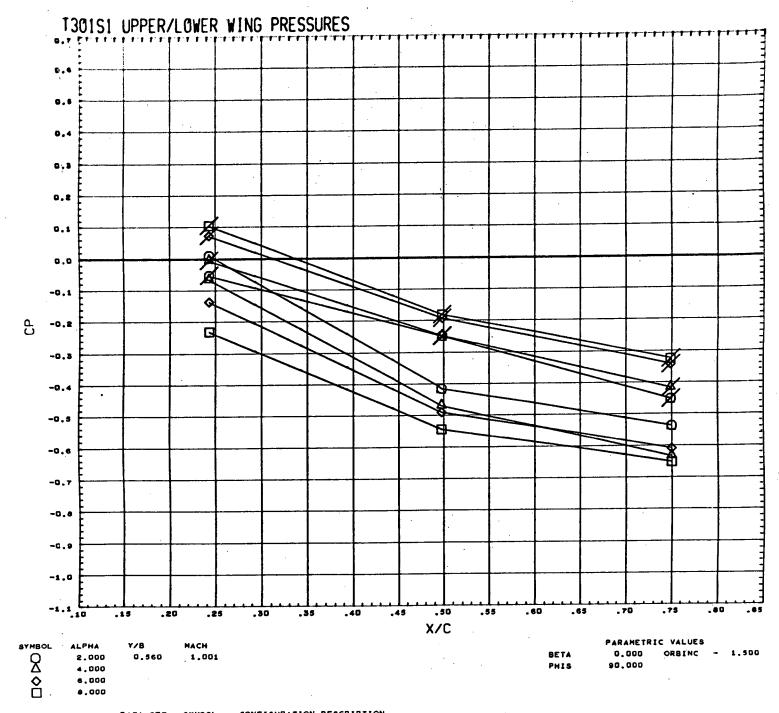
PAGE 585

1

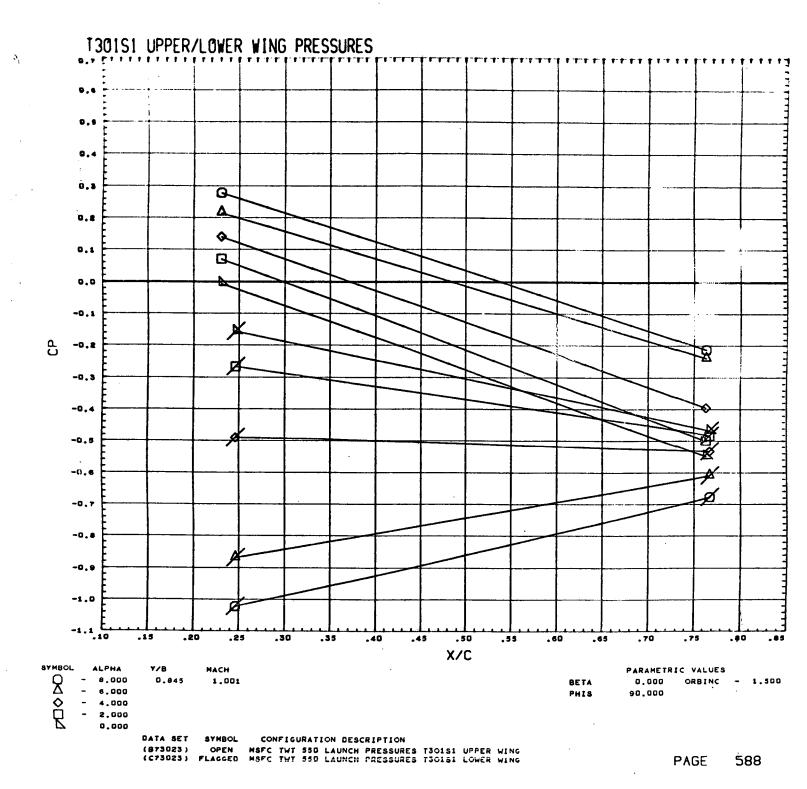
0.5 0.4 0.3 0 A 0.# Q 0.1 0.0 -0.5 -0.2 Ø -0.3 -0.4 -0.5 -0.6 -0.7 -0.8 -0.9 -1.D -1.1.10 .50 .55 .60 .65 .20 X/C SYMBOL ALPHA PARAMETRIC VALUES Y/B MACH ORBINC - 1.500 0.000 8 8.000 0.560 1.001 BETA 90.000 6.000 PHIS 4.000 2,000 0.000 DATA SET SYMBOL CONFIGURATION DESCRIPTION (873023) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING PAGE 586

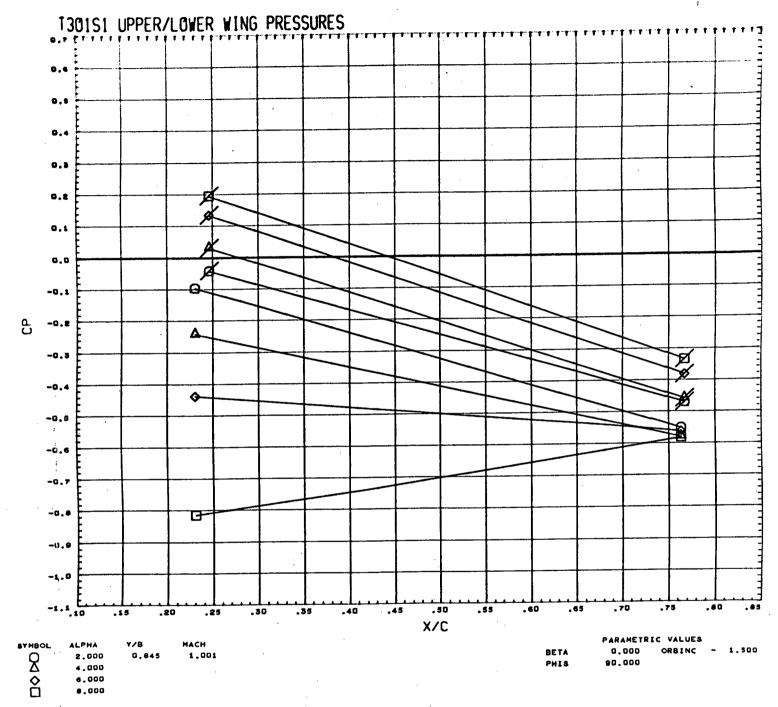
T301S1 UPPER/LOWER WING PRESSURES

0.4



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING





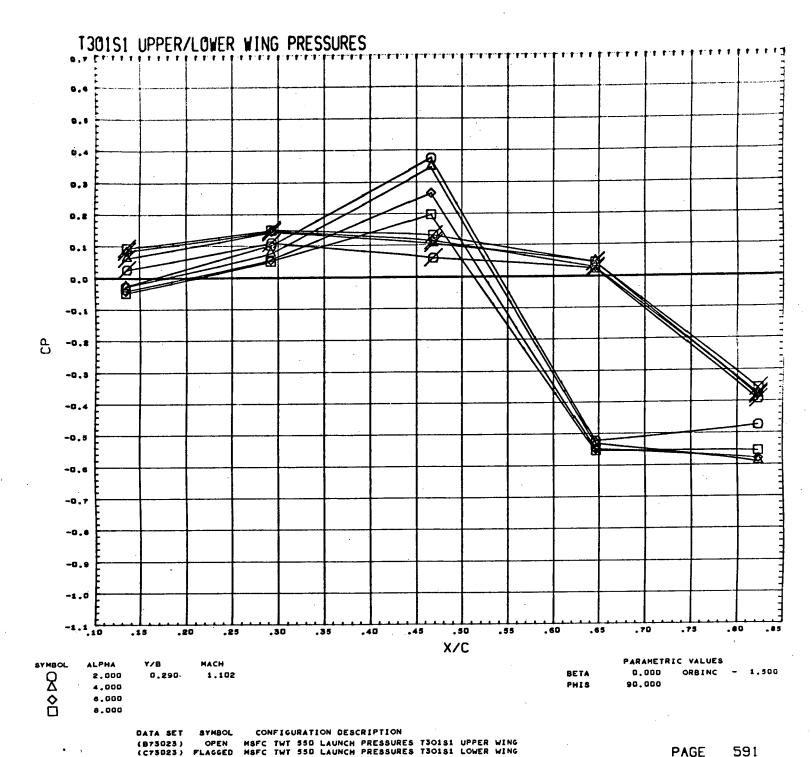
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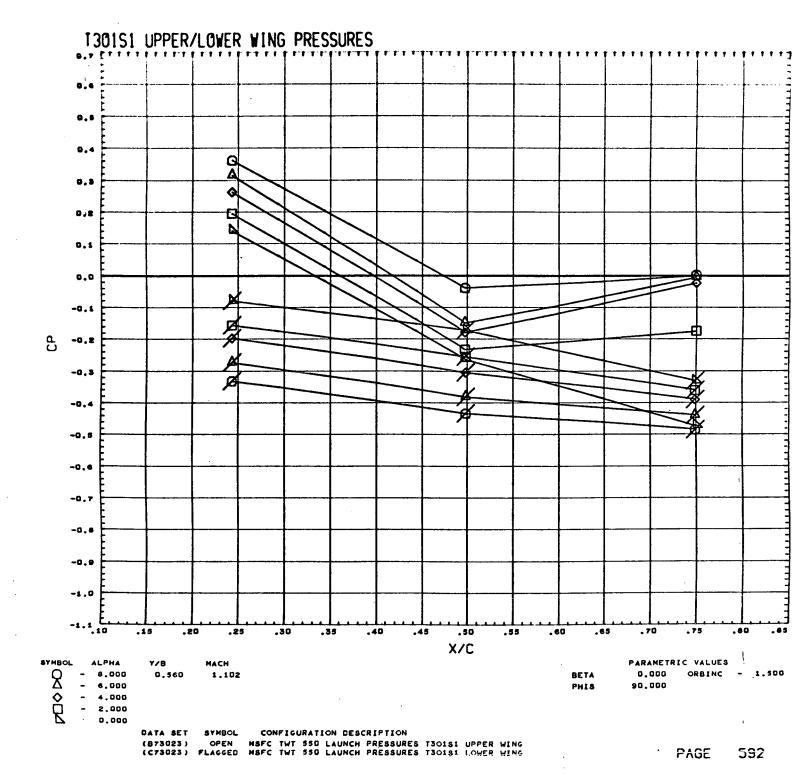
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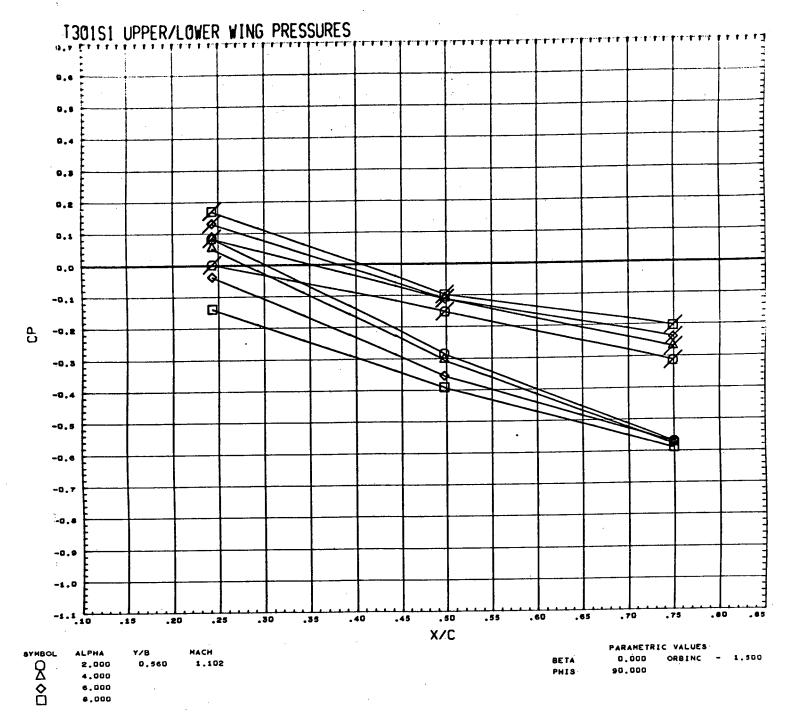
(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

PAGE

590

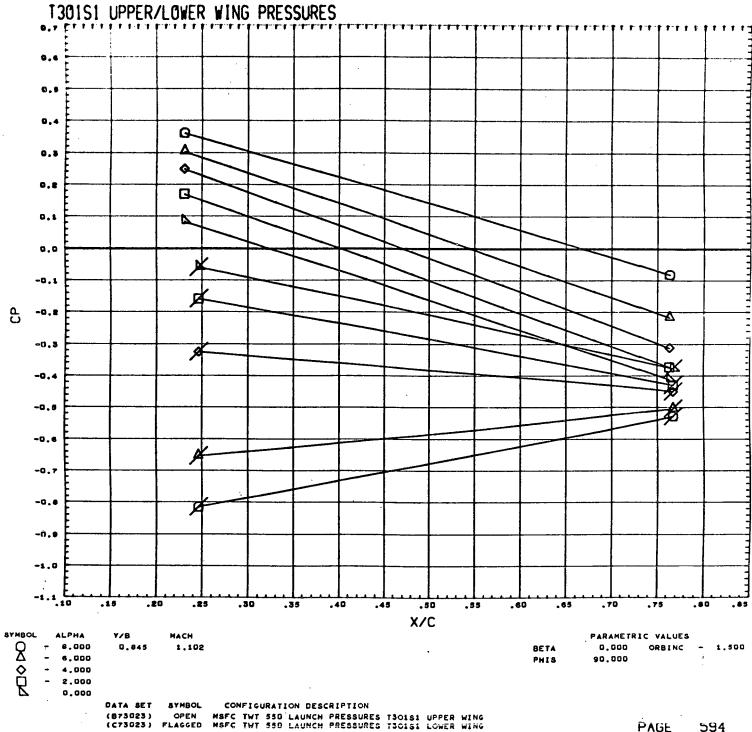


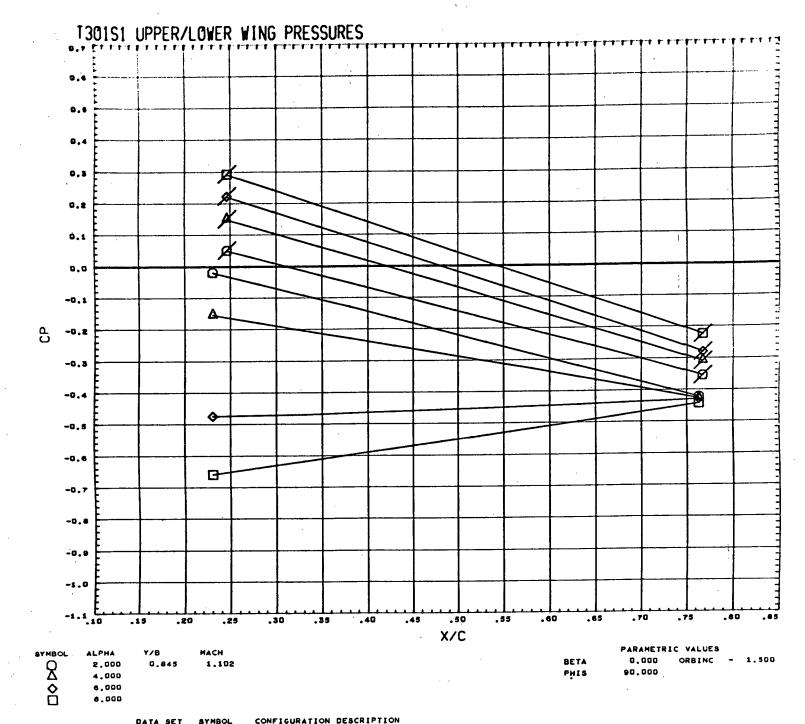




DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

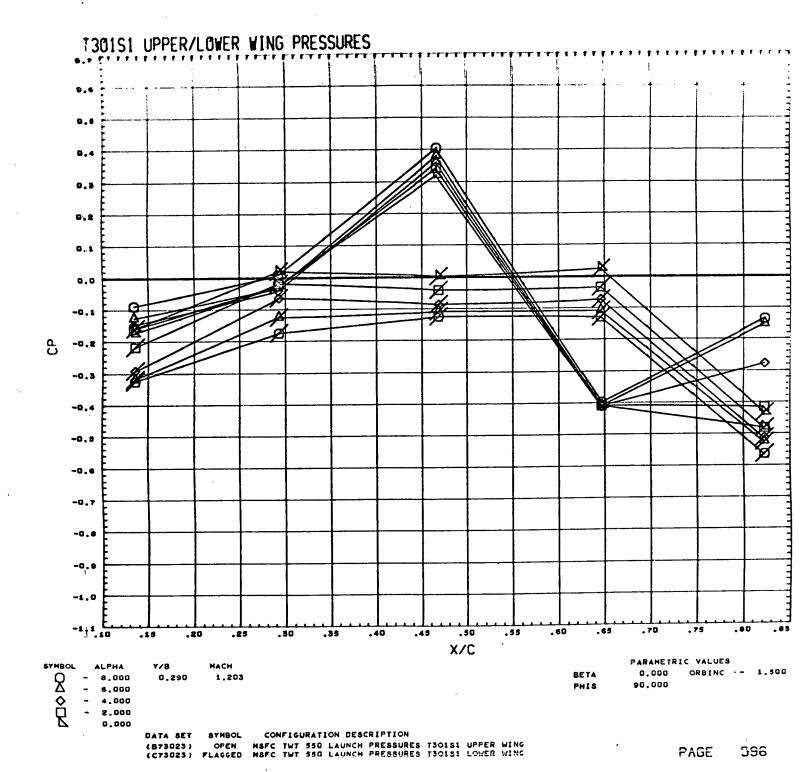


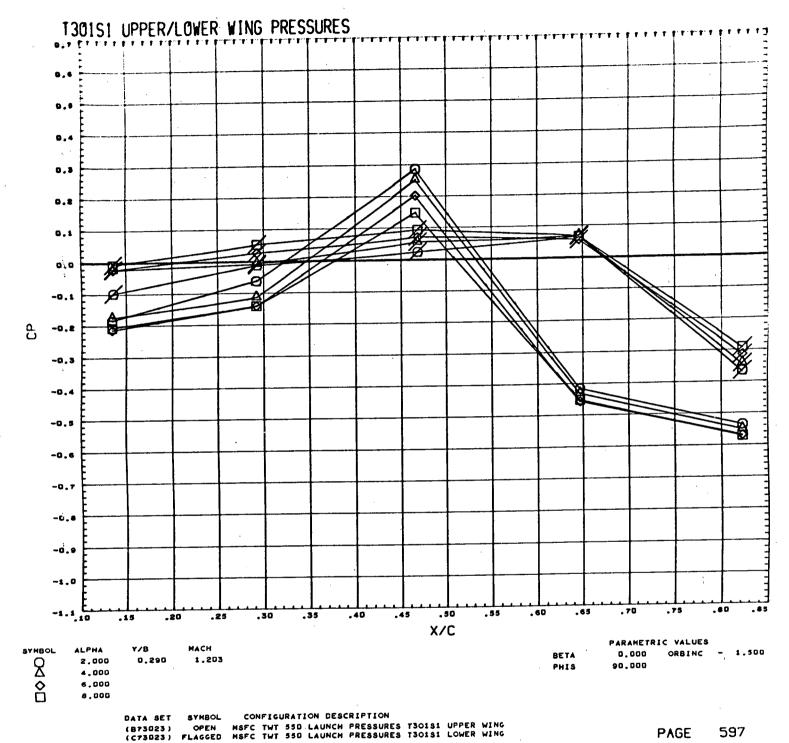


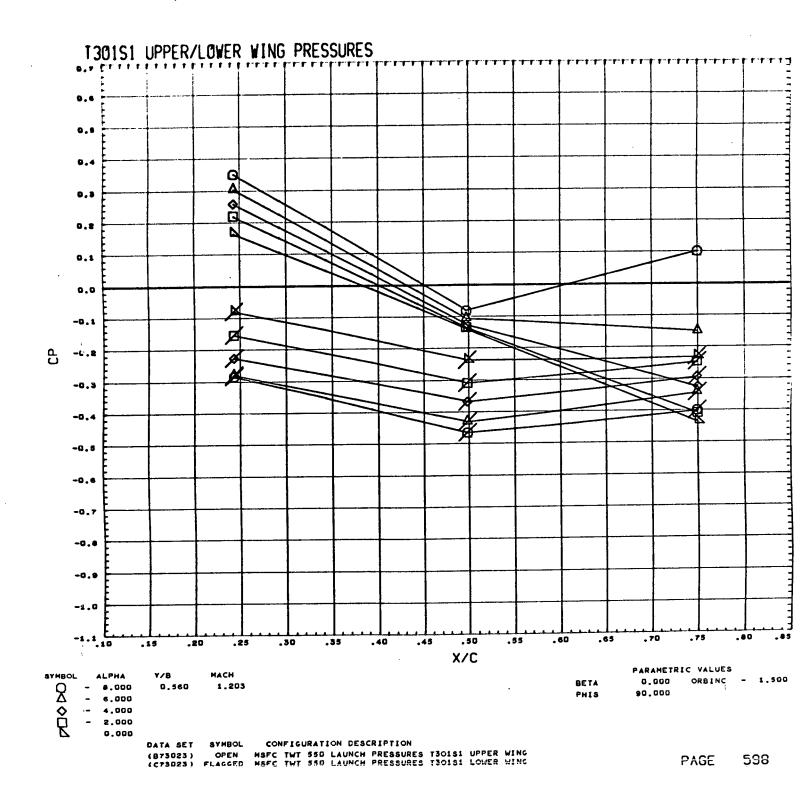
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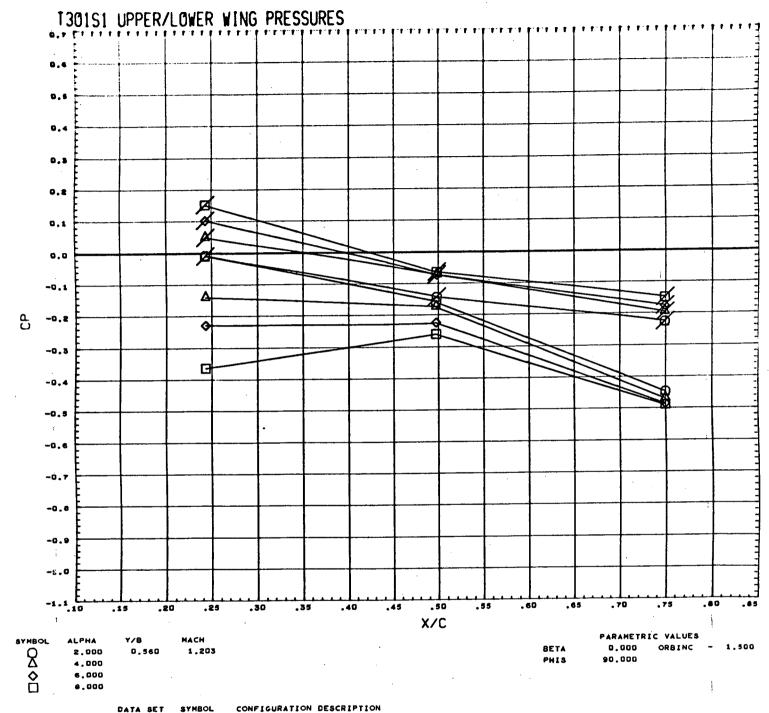
(873023) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

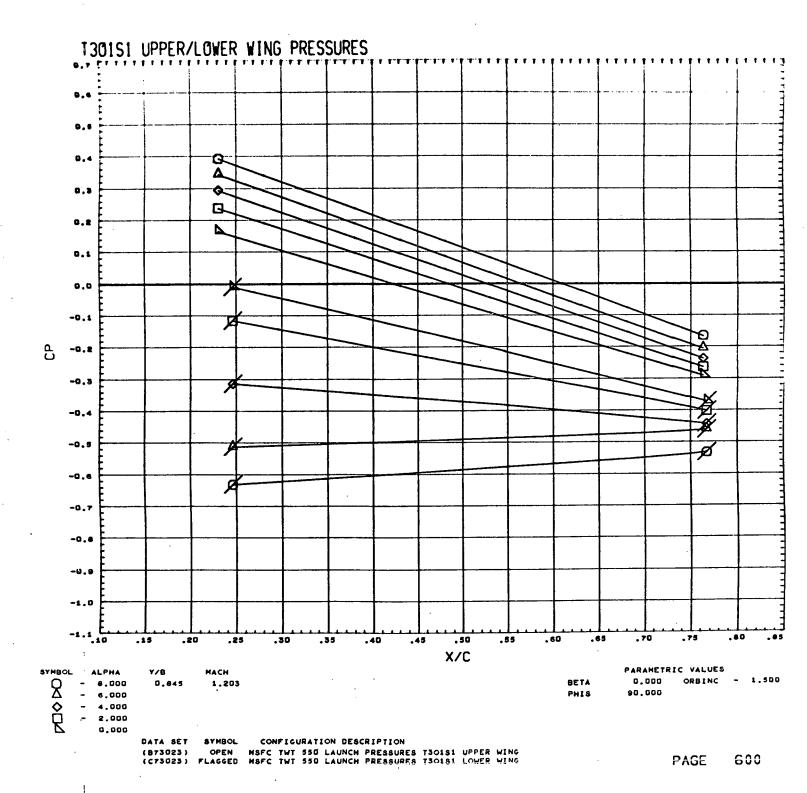


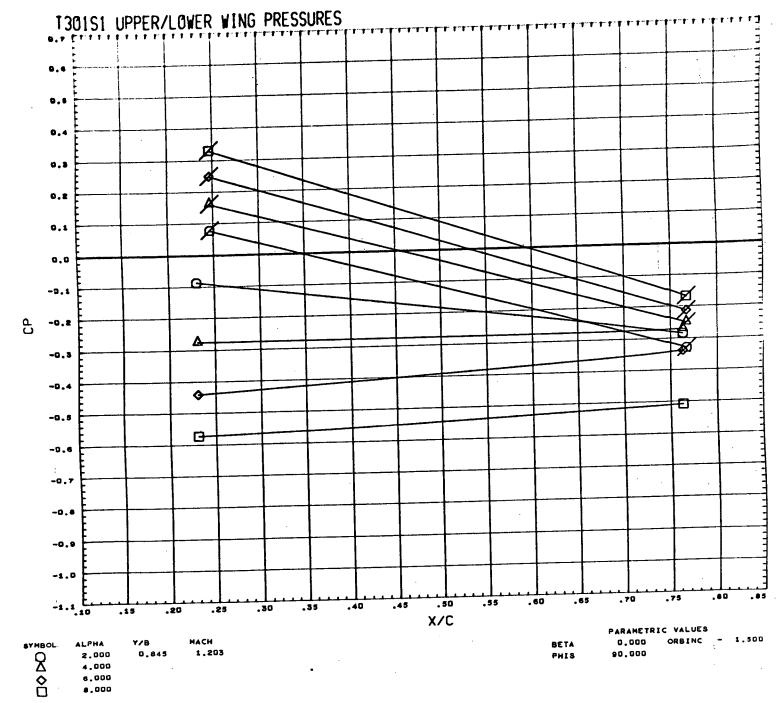






(873023) OPEN MSFC TWT 550 LAUNCH PRESSURES TSO1S1 UPPER WING (C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES TSO1S1 LOWER WING

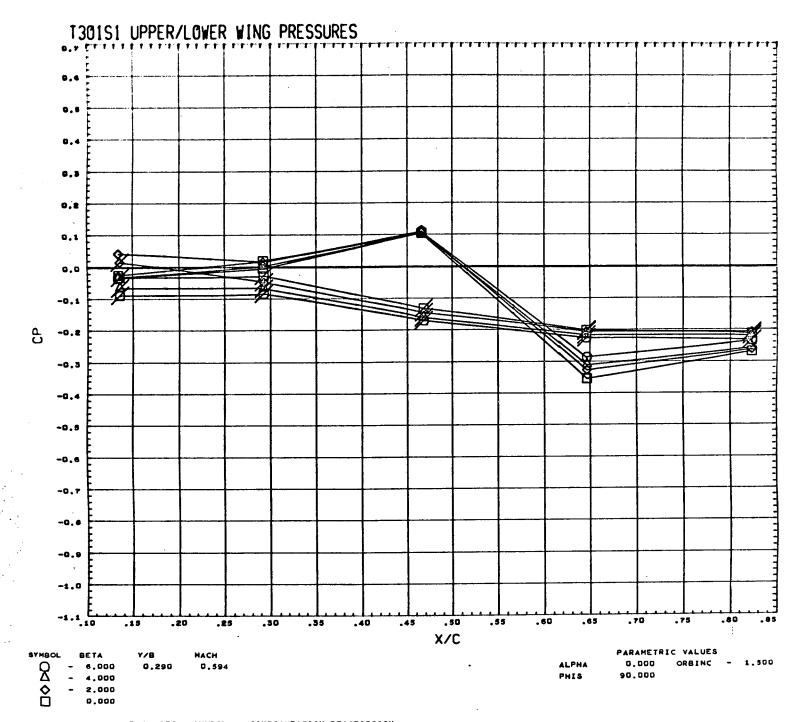




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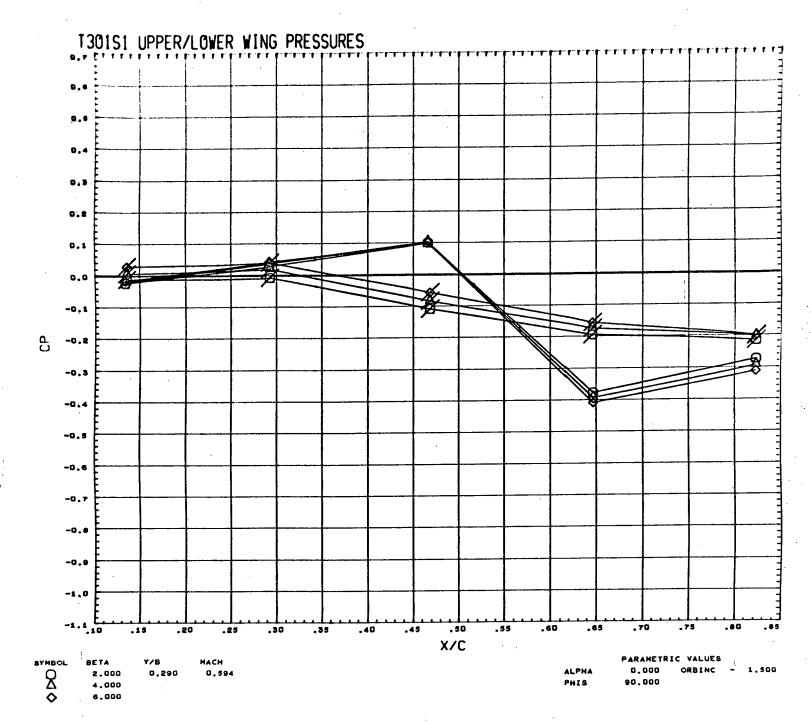
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(C73023) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

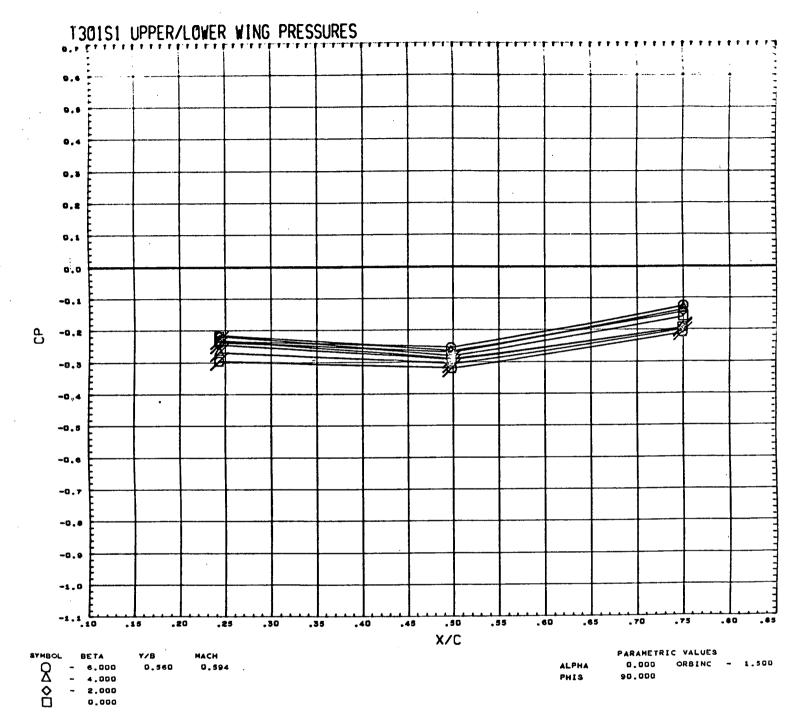
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(C73024) PLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

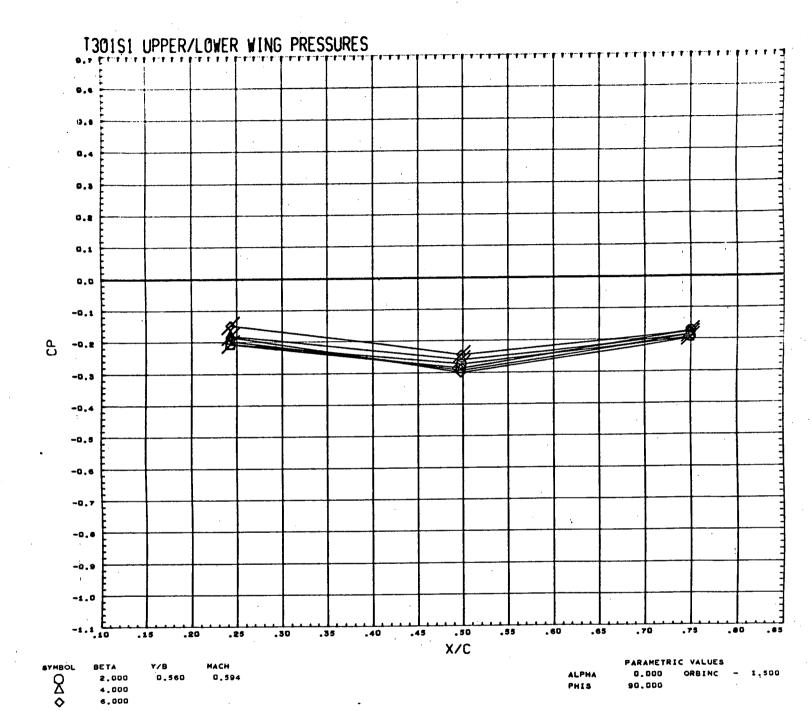
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(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

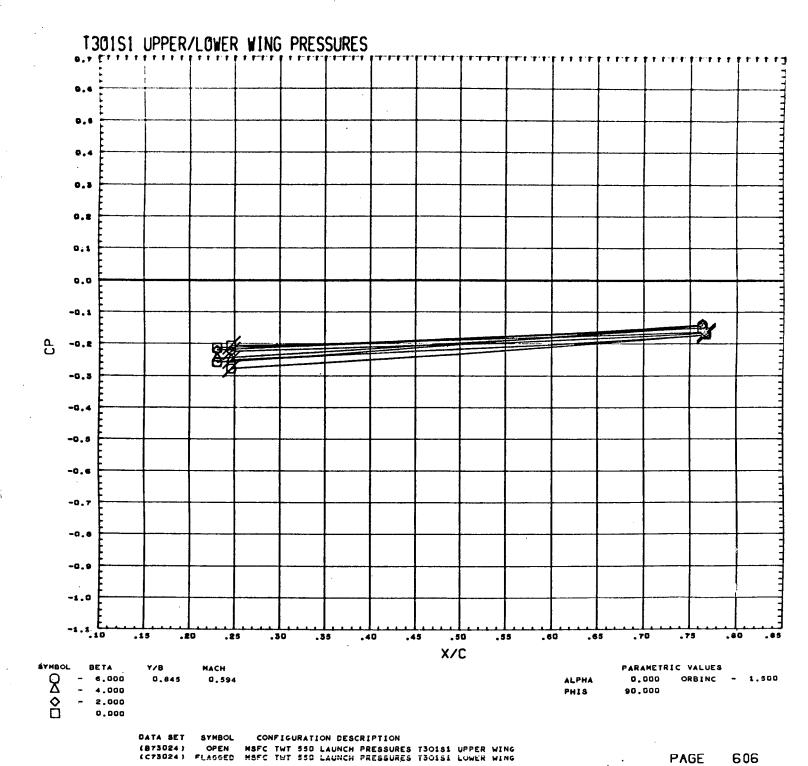
(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

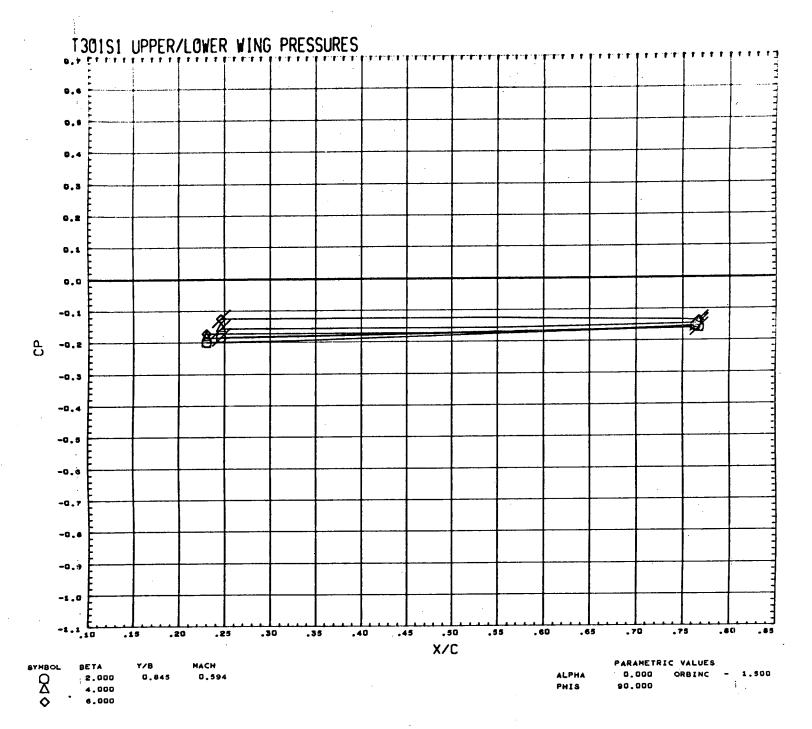


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

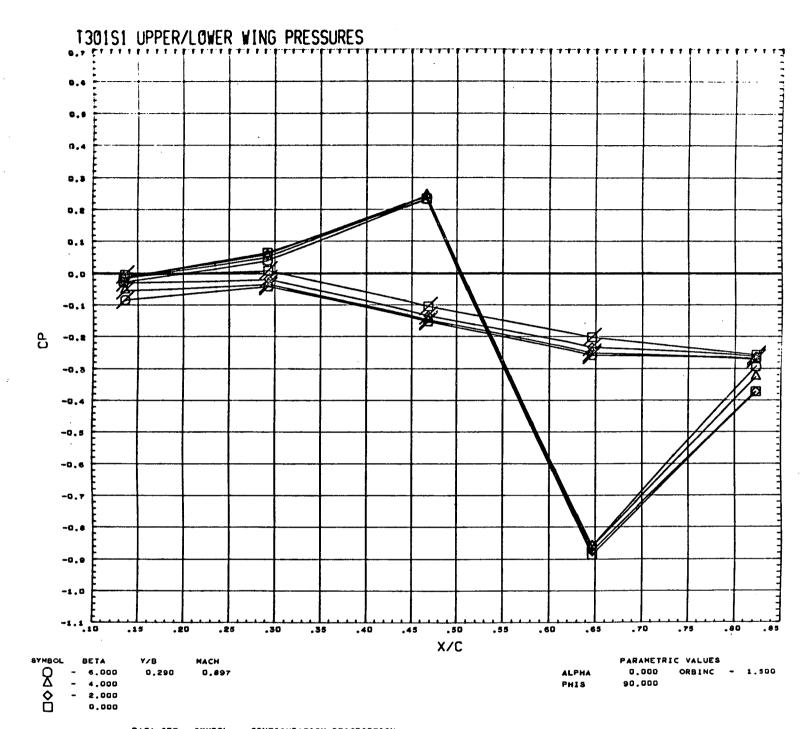




DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

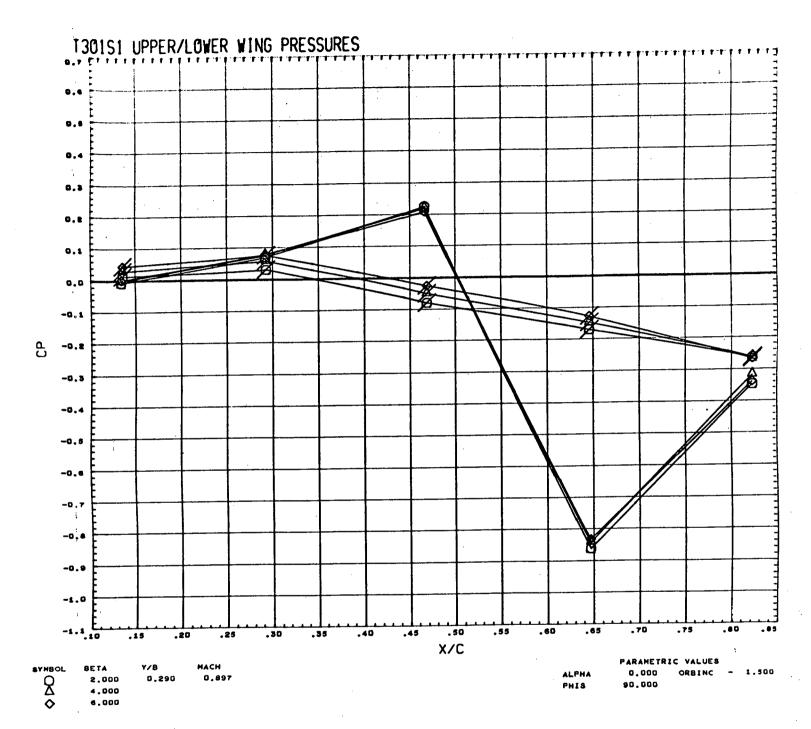
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

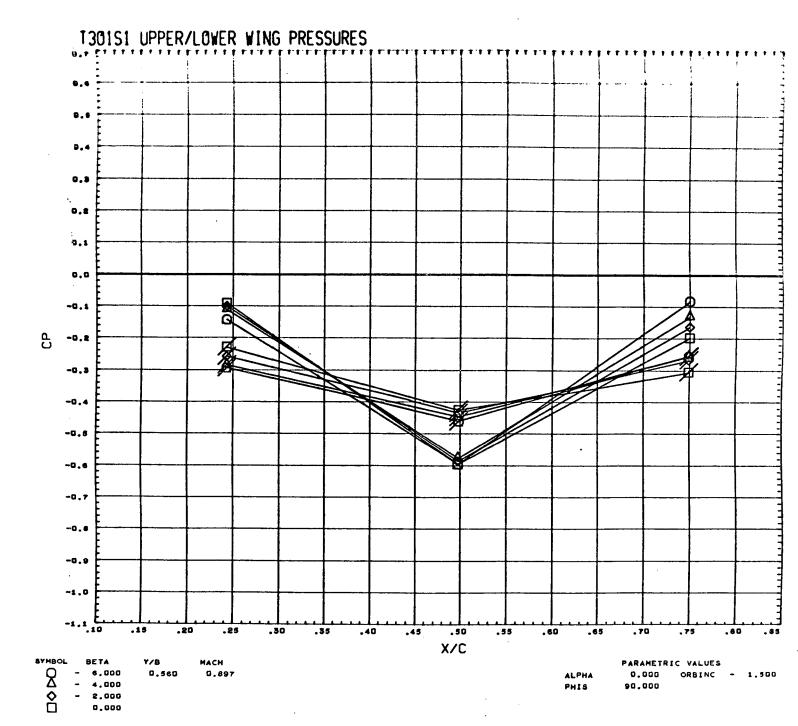
(673024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

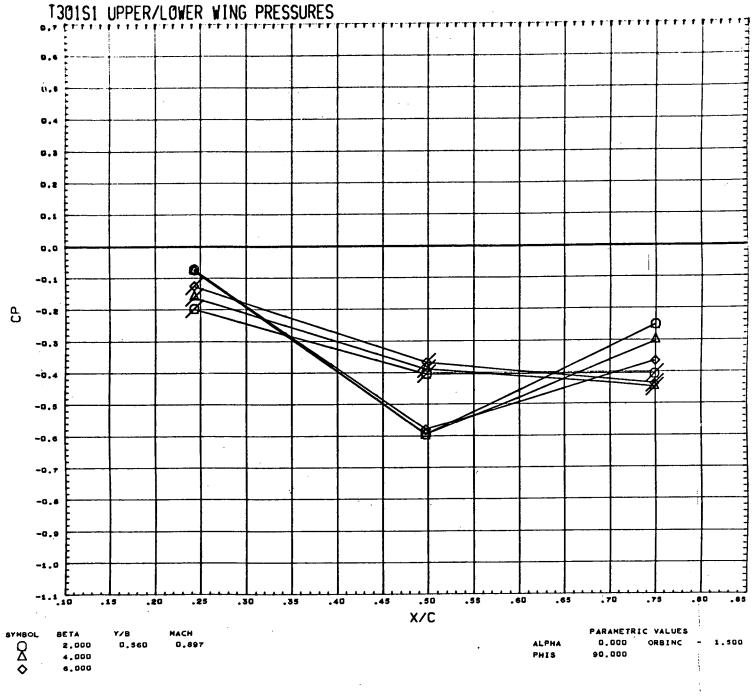
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873024) OPEN MSFC TWT 55D LAUNCH PRESSURES T30151 UPPER WING

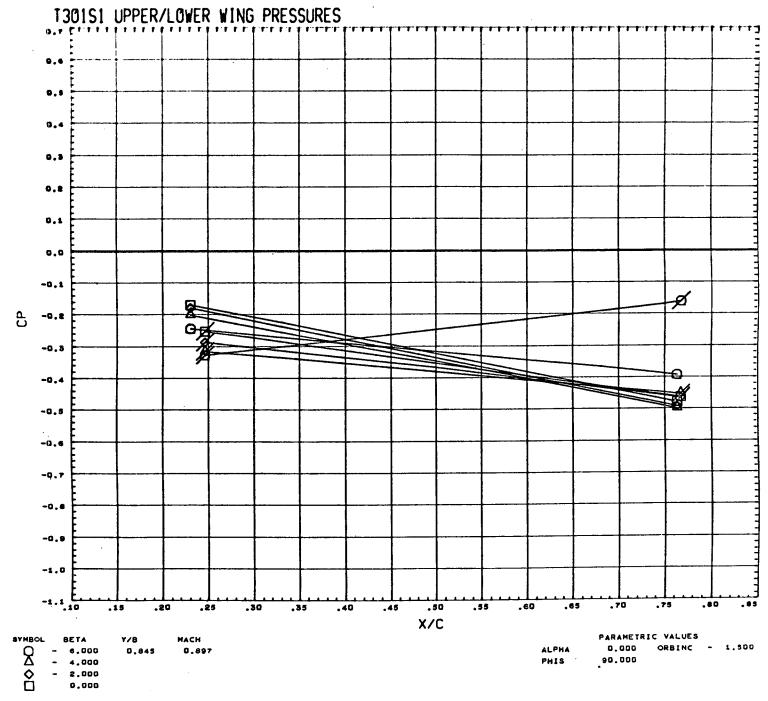
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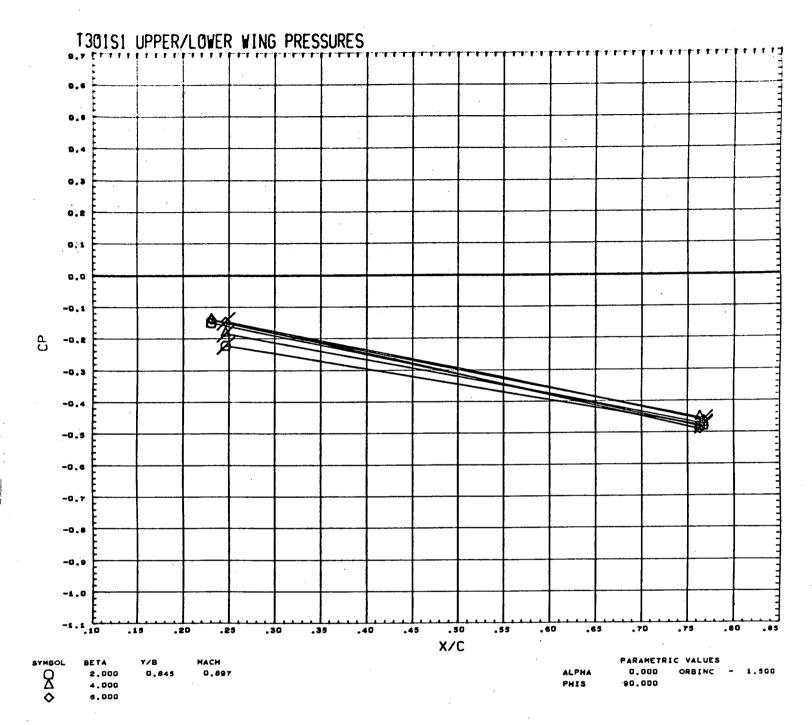
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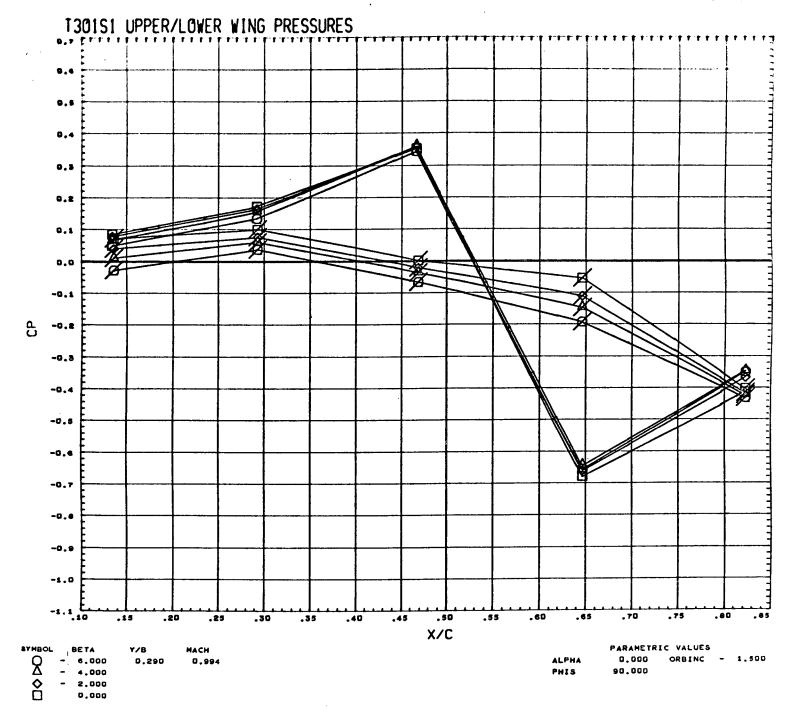
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
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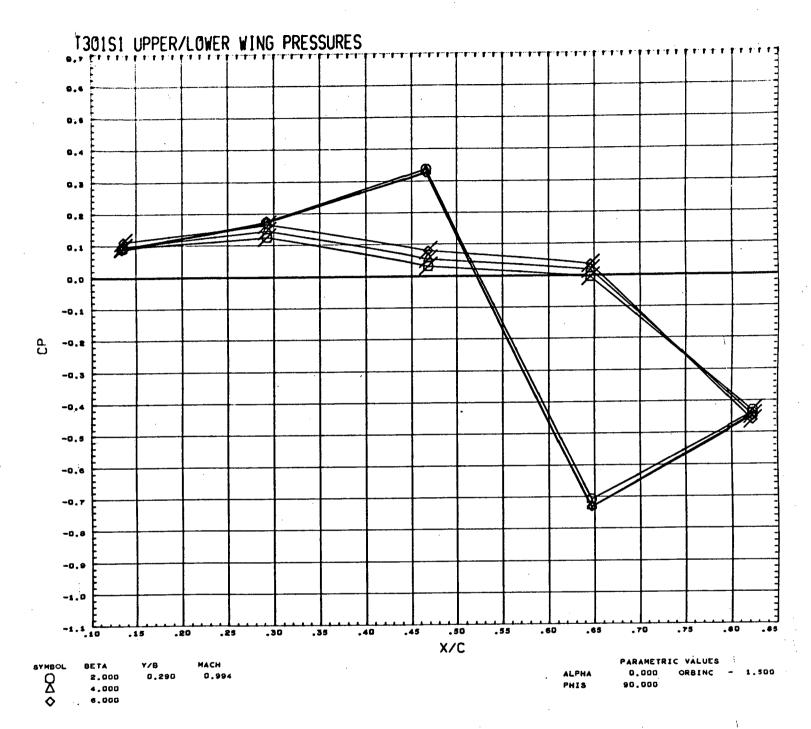
OATA SET SYMBOL CONFIGURATION DESCRIPTION
(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873024) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING

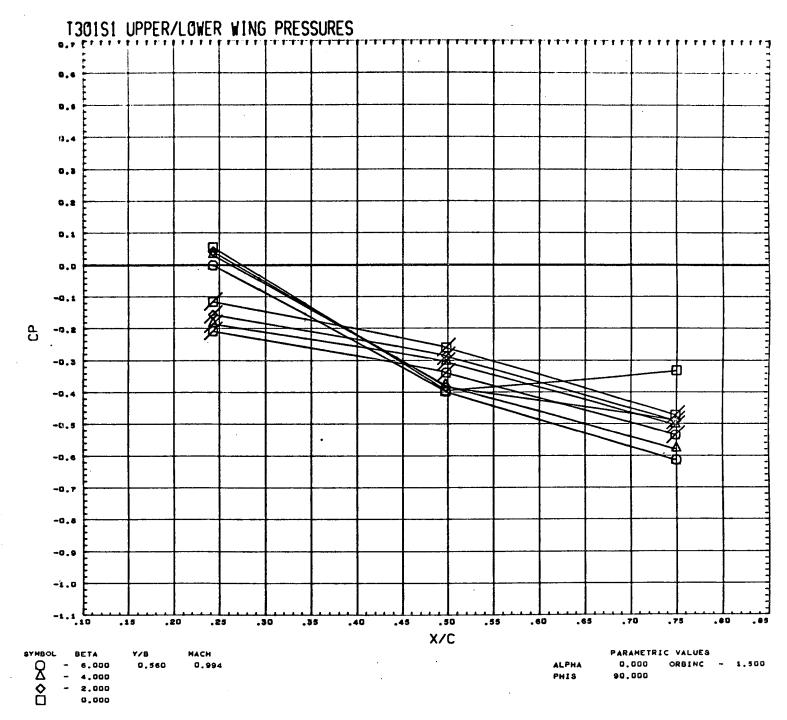
(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

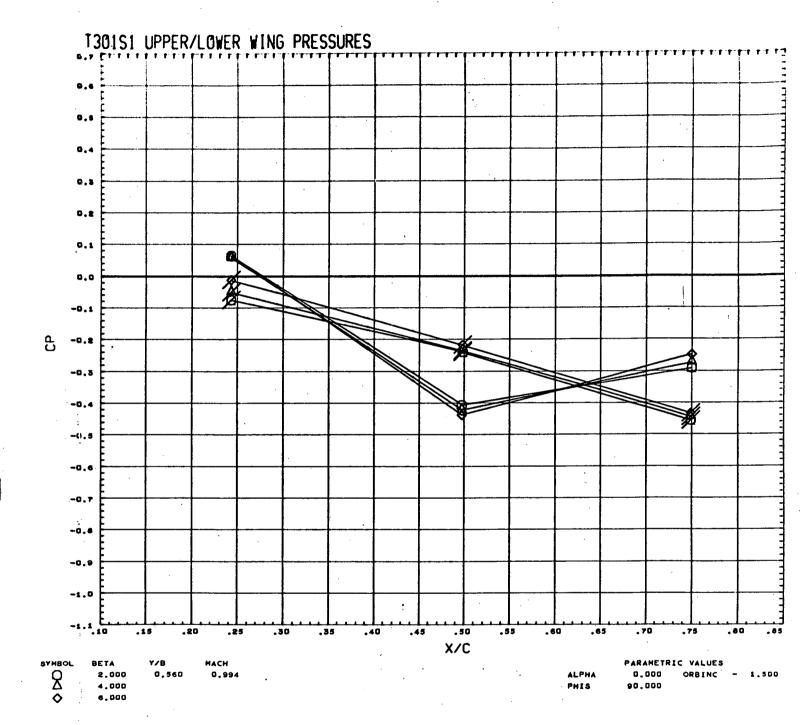
(B73024) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 UPPER WING

(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING



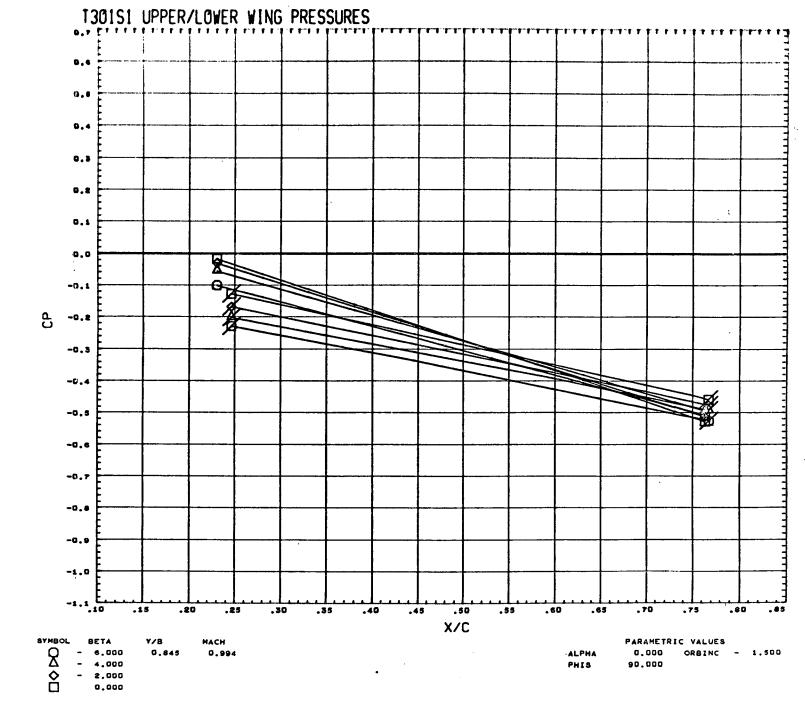
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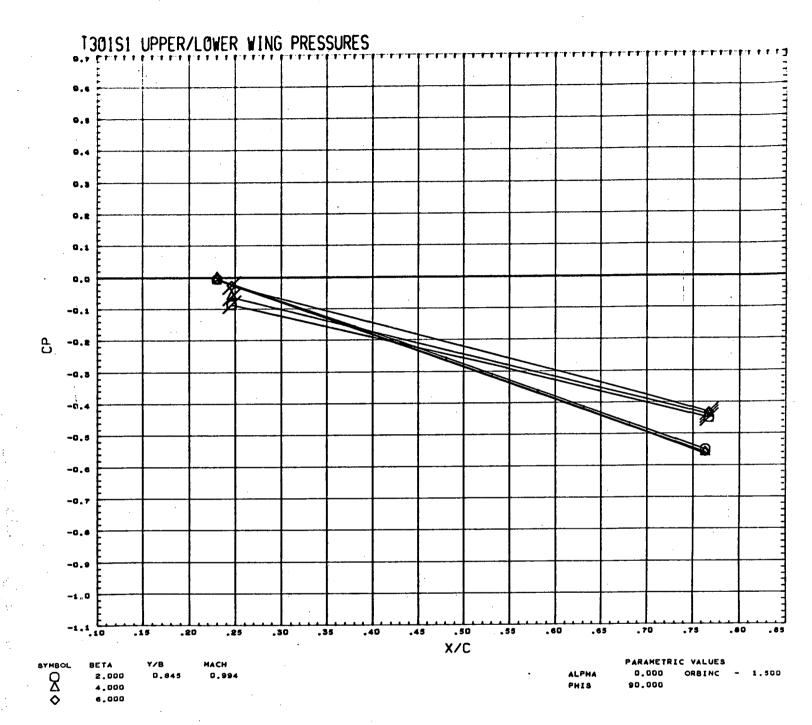
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(C73024) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

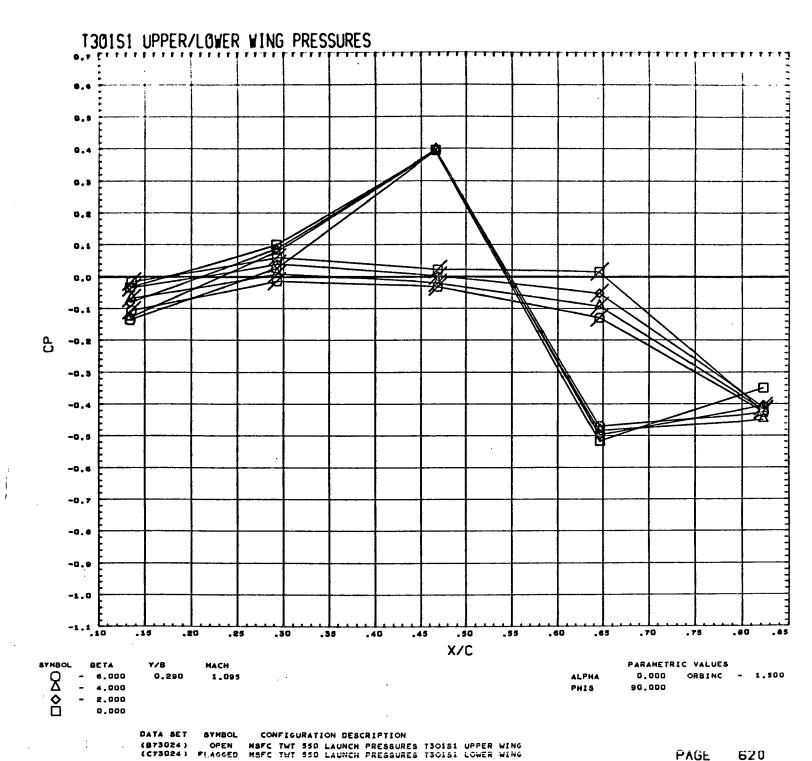


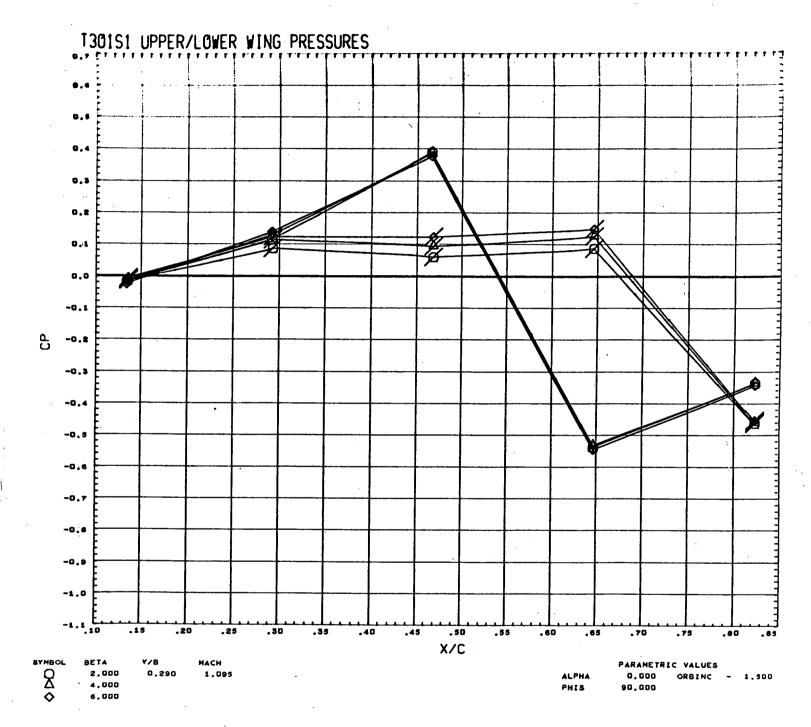
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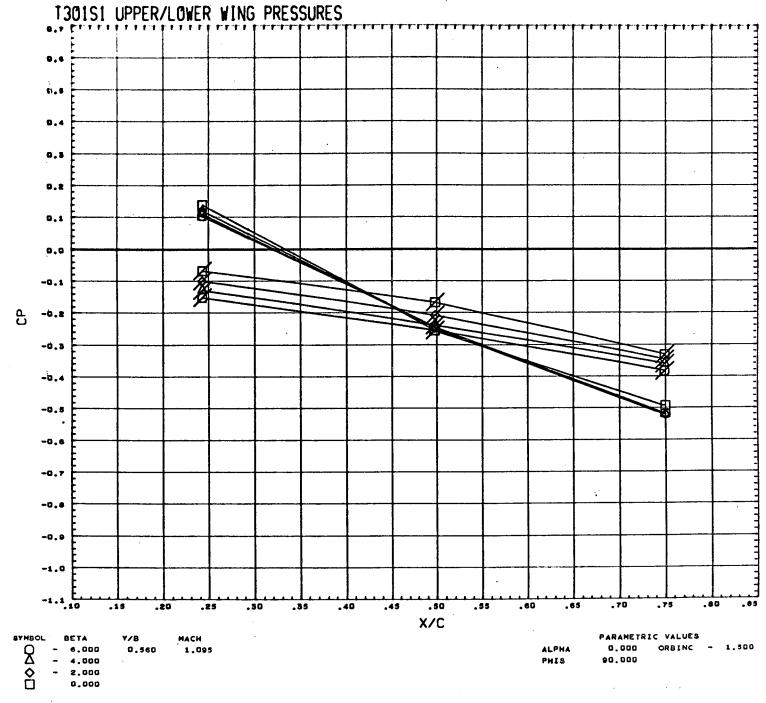
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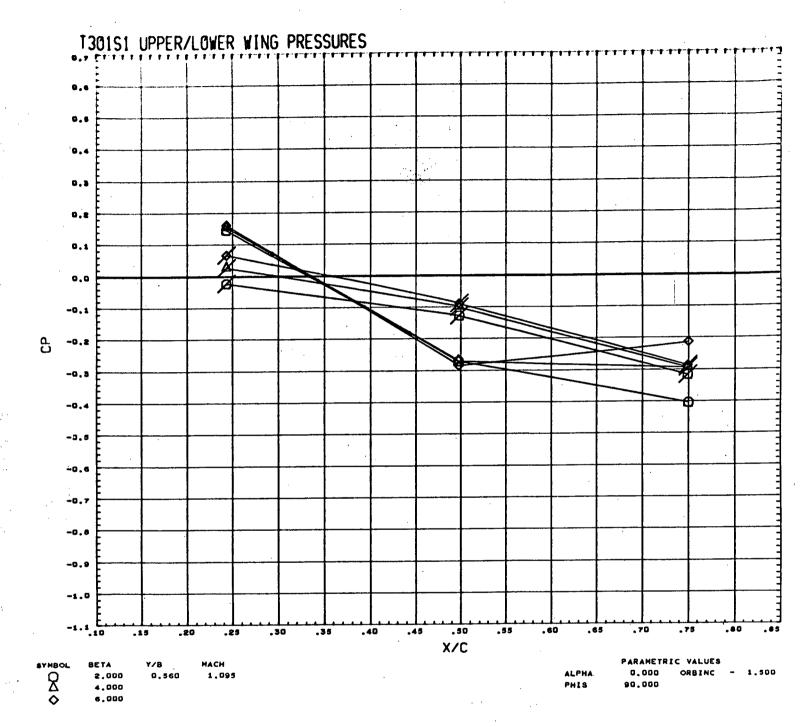


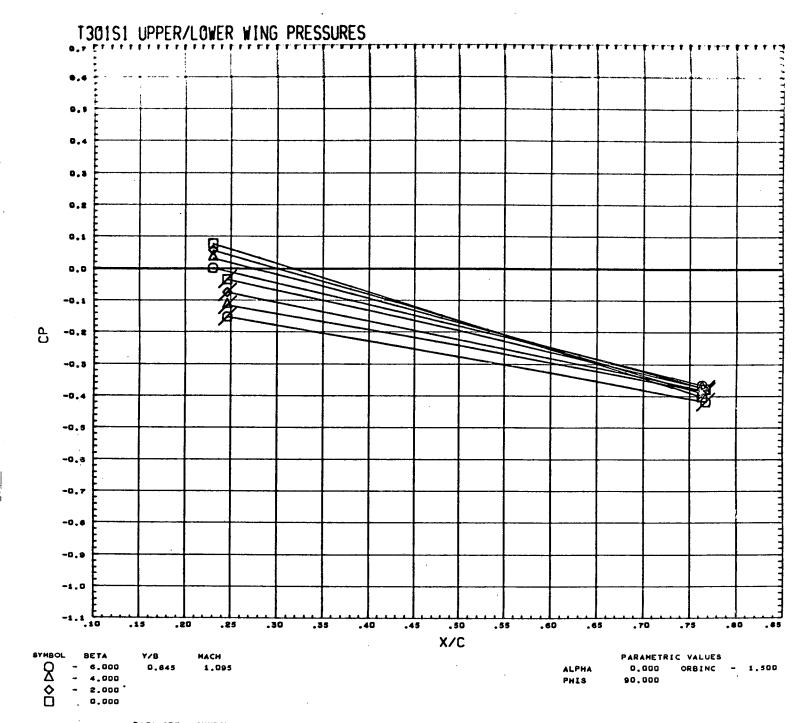


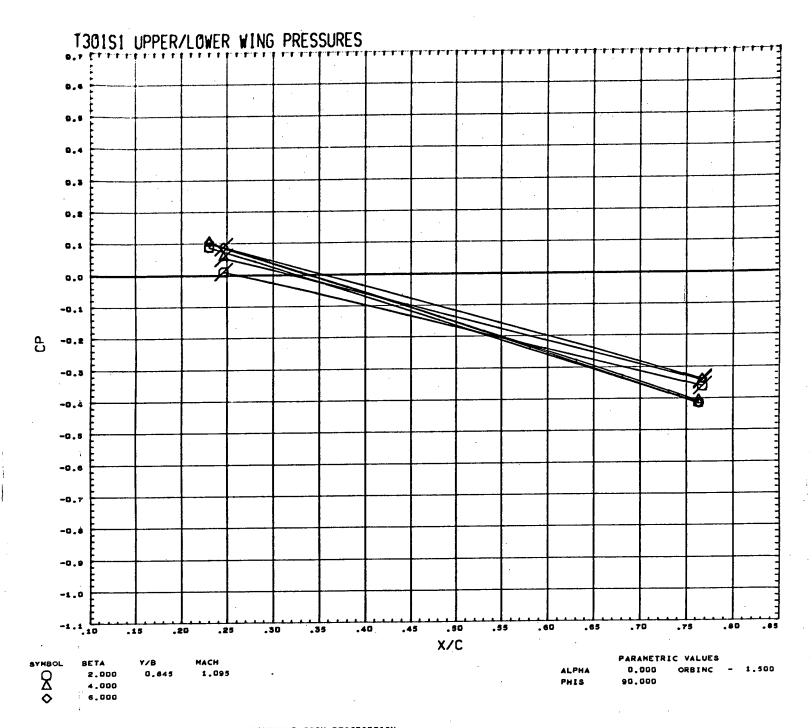


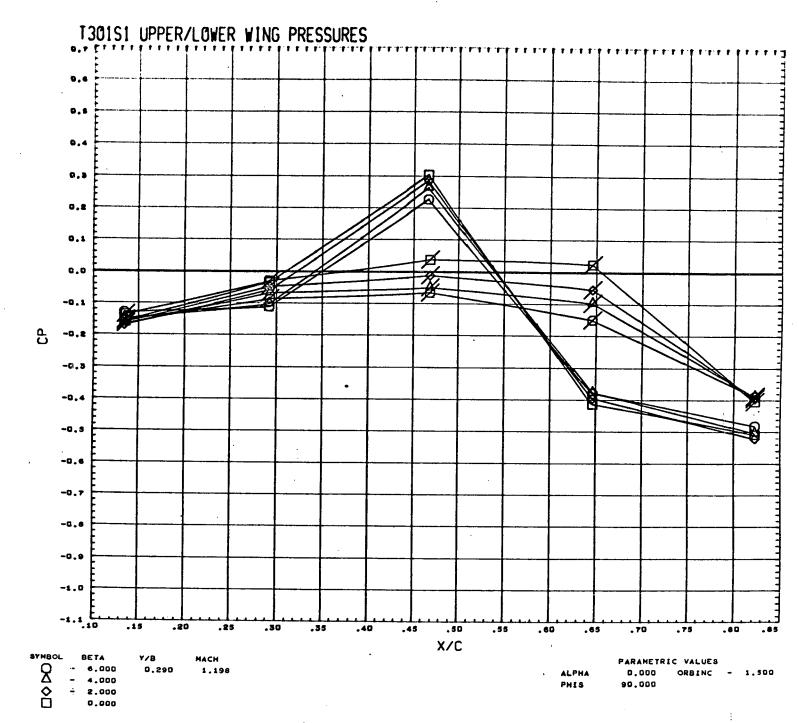


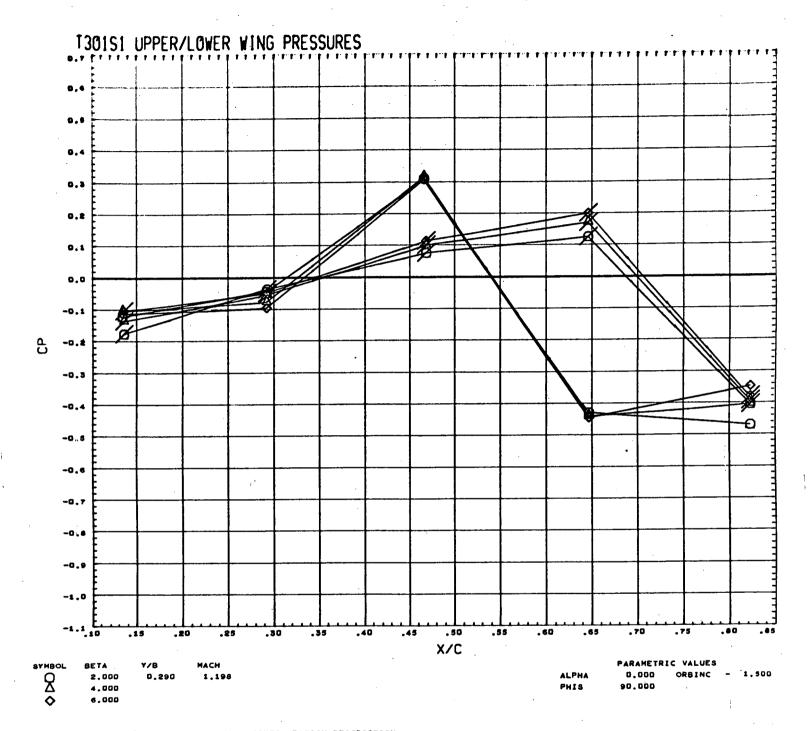


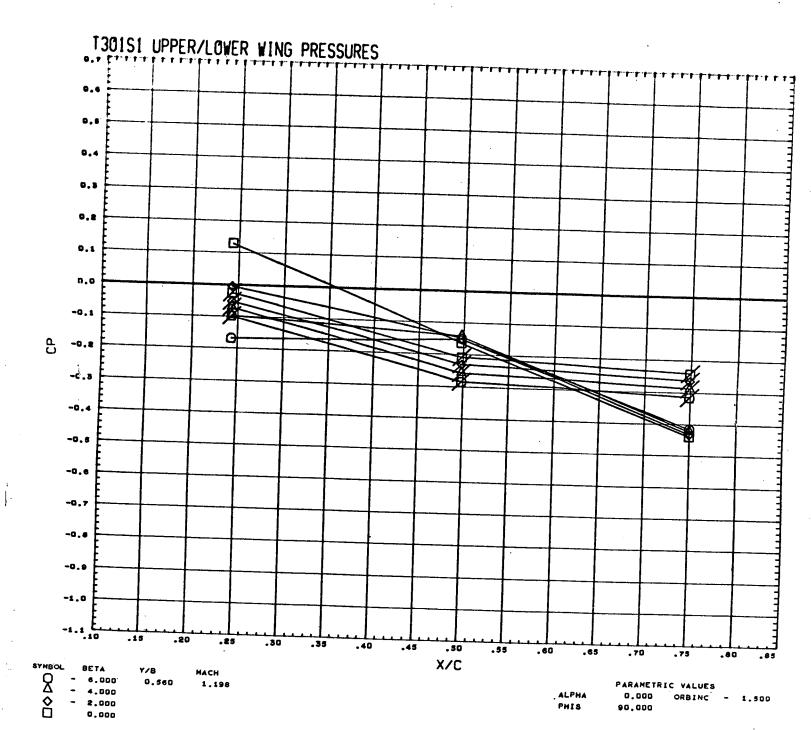


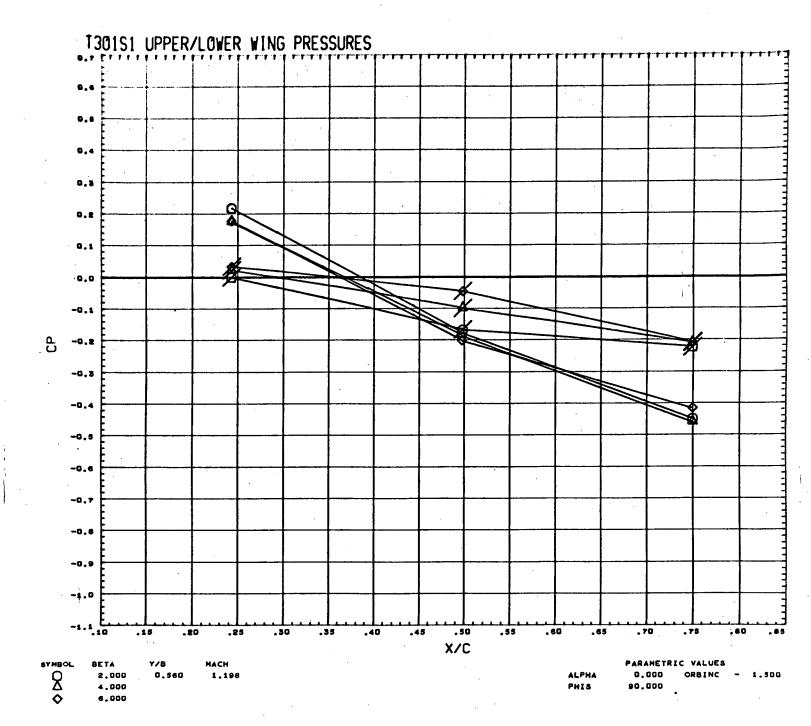


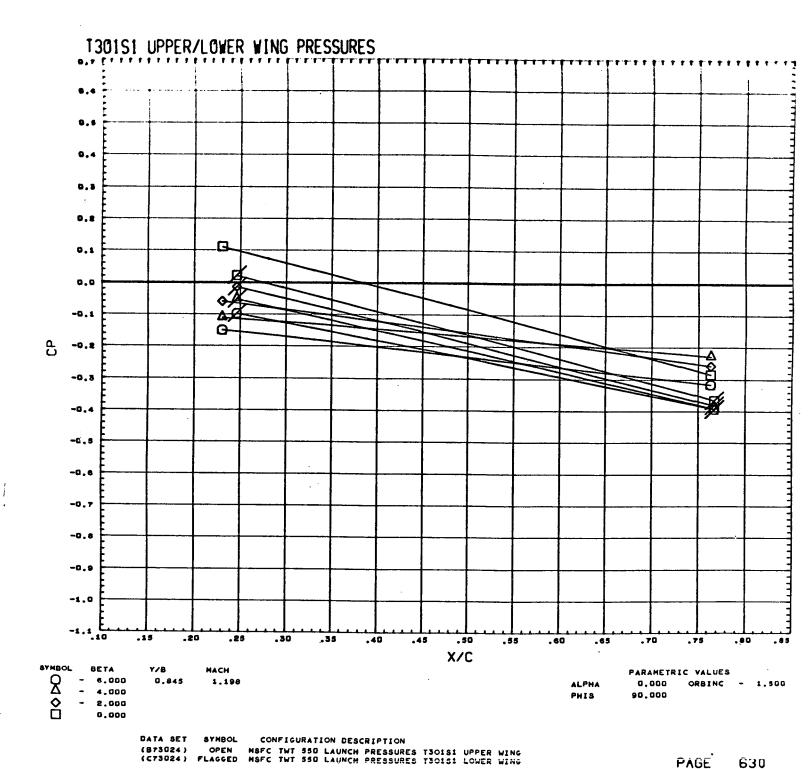


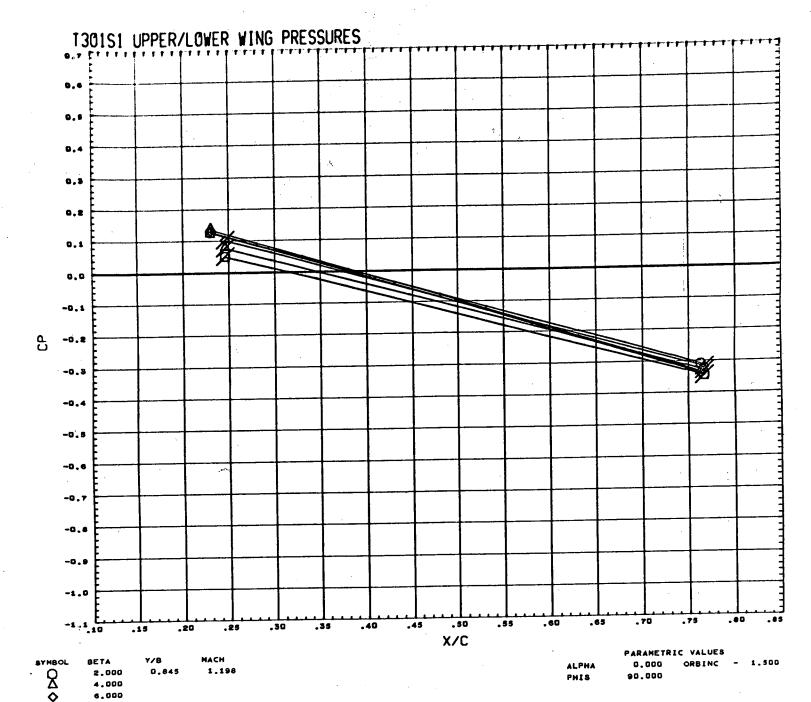


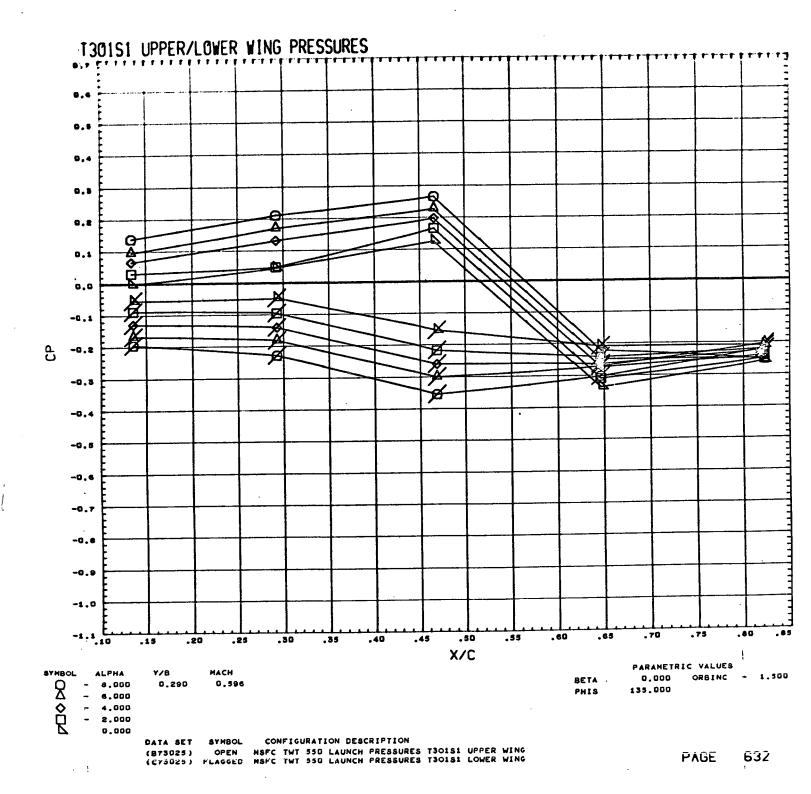


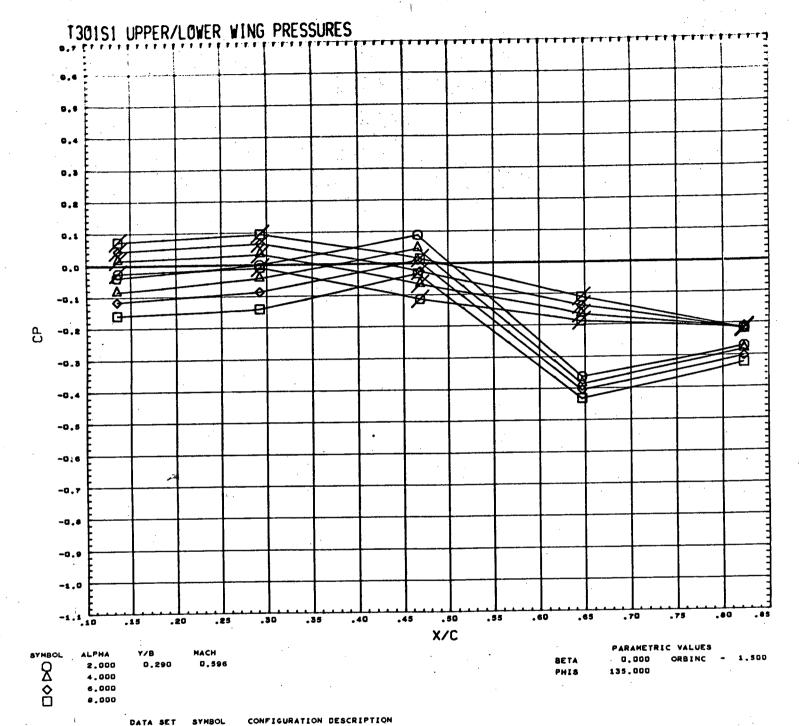


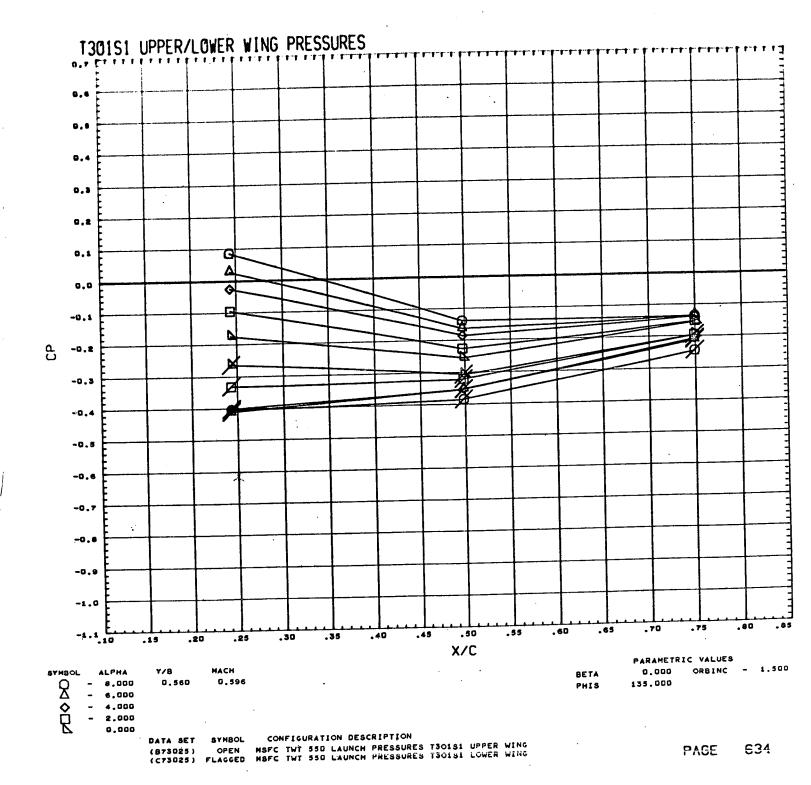


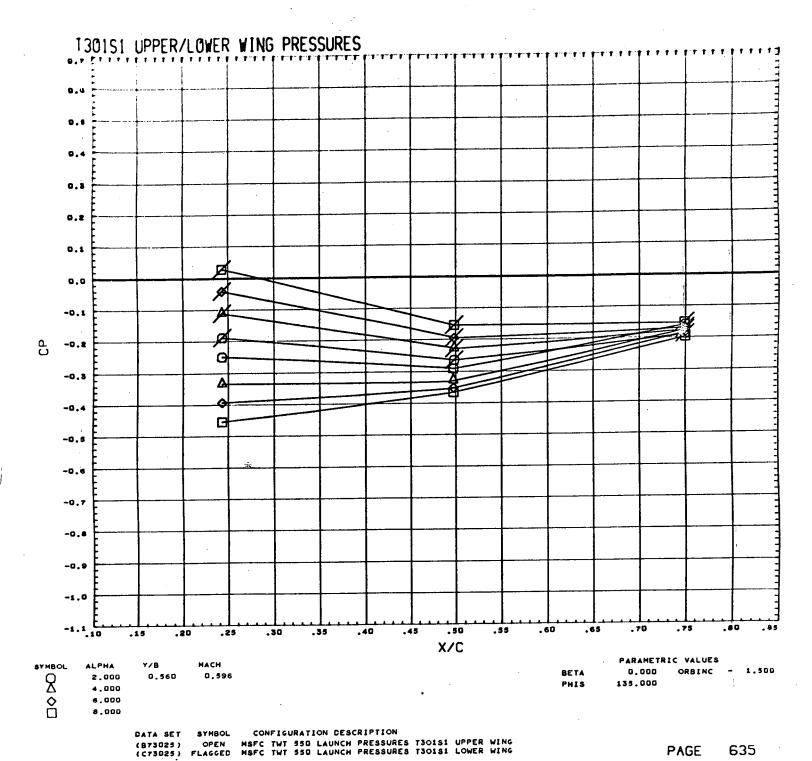






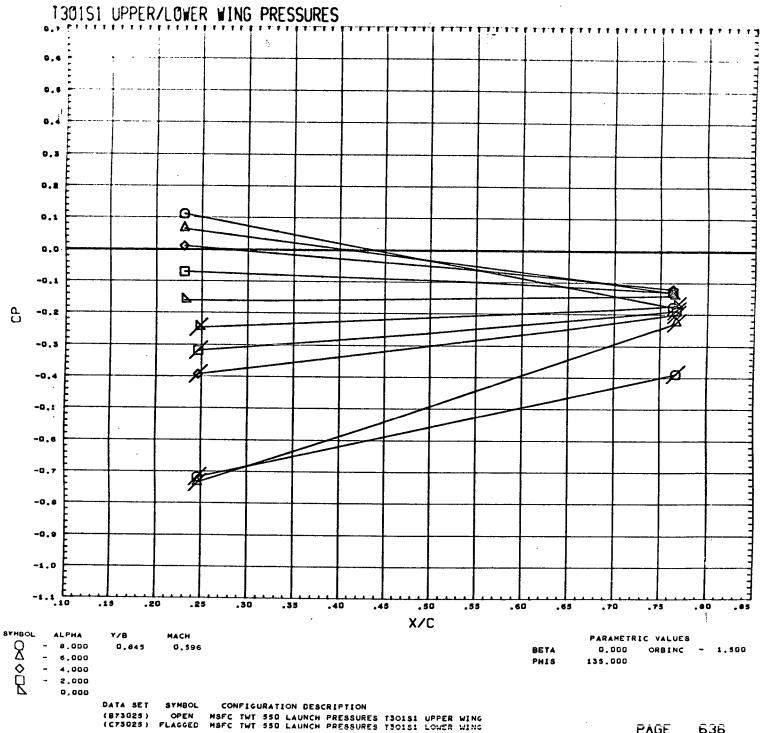


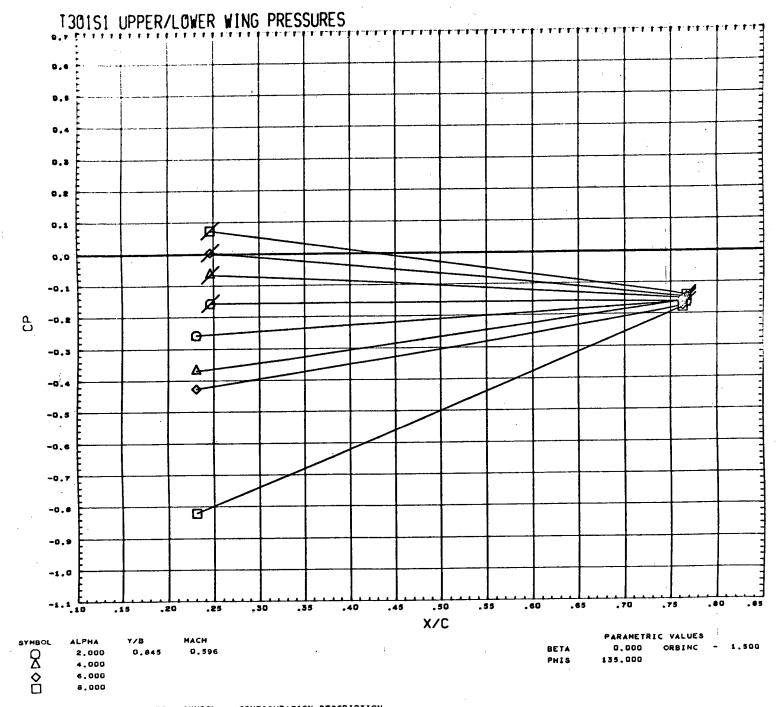


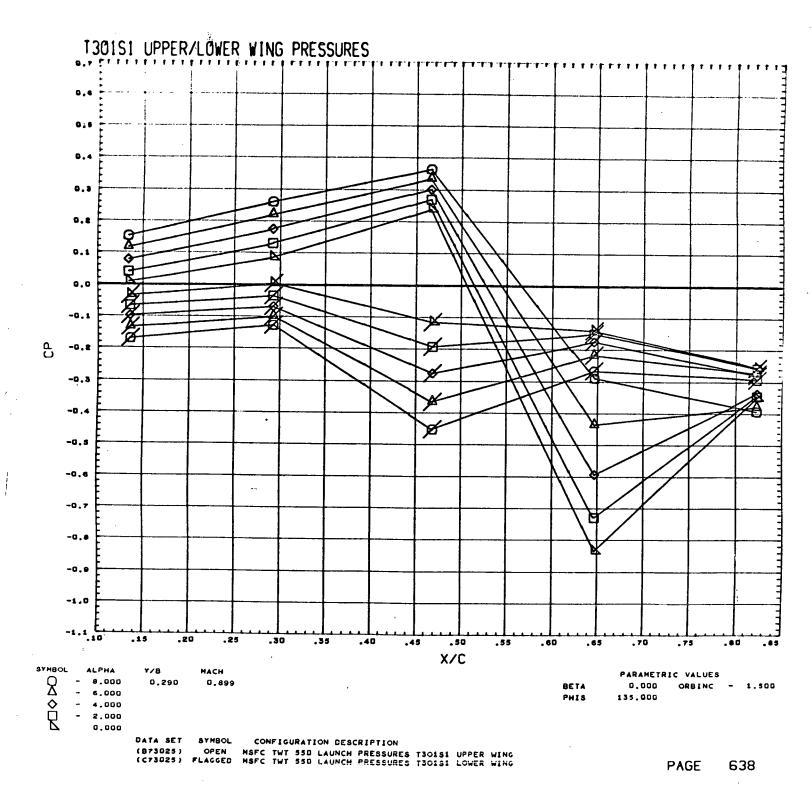


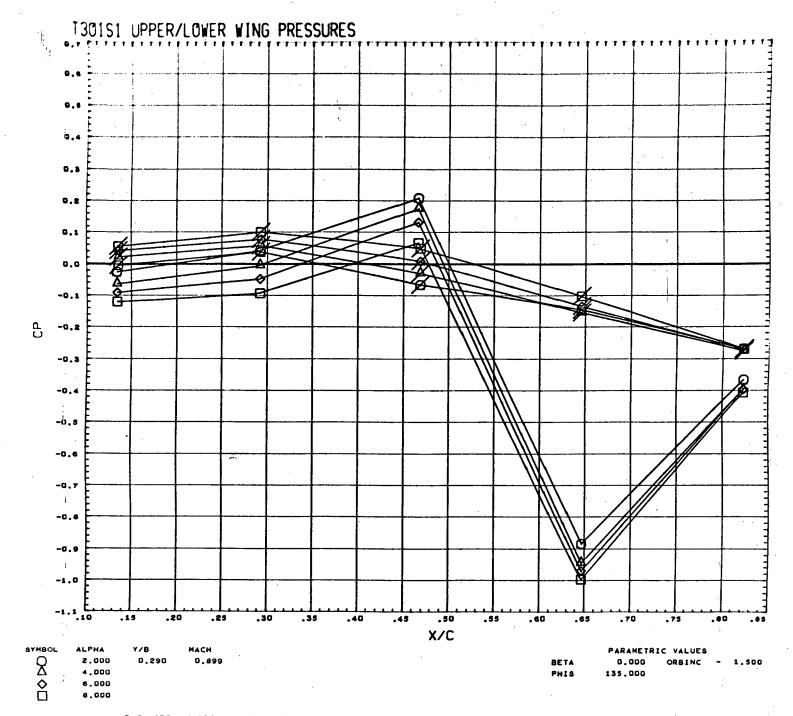
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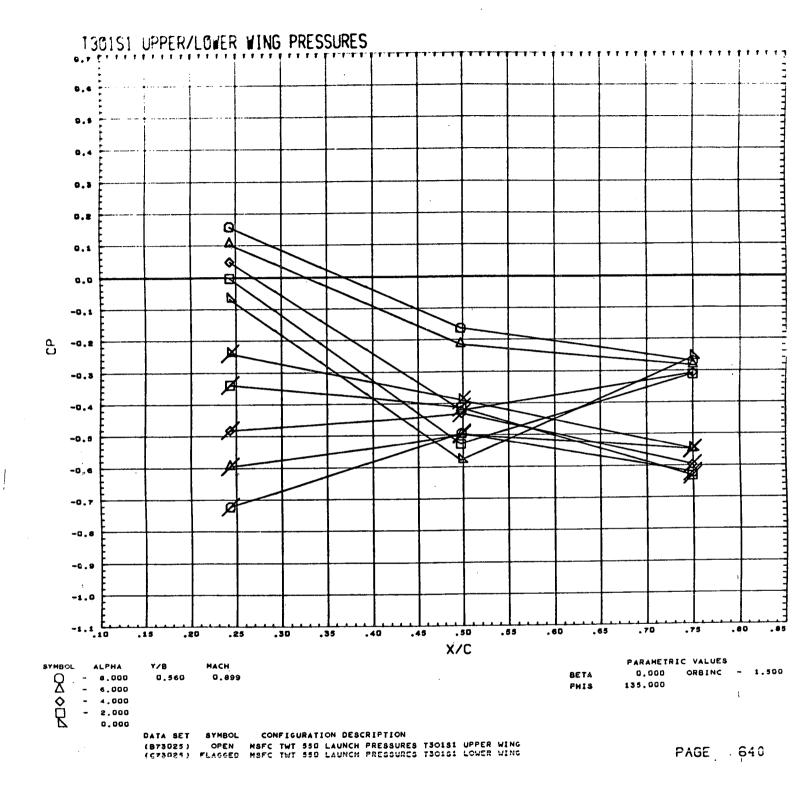
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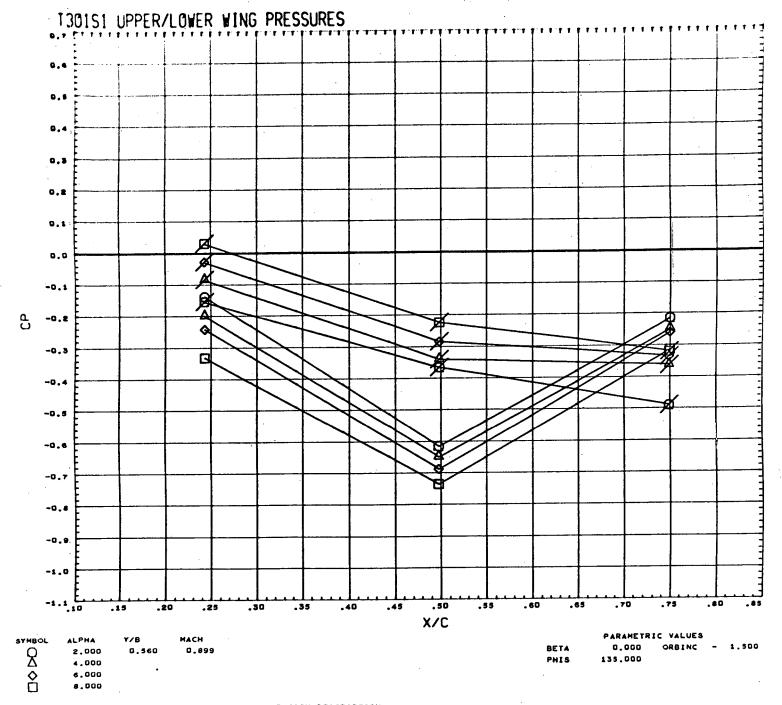


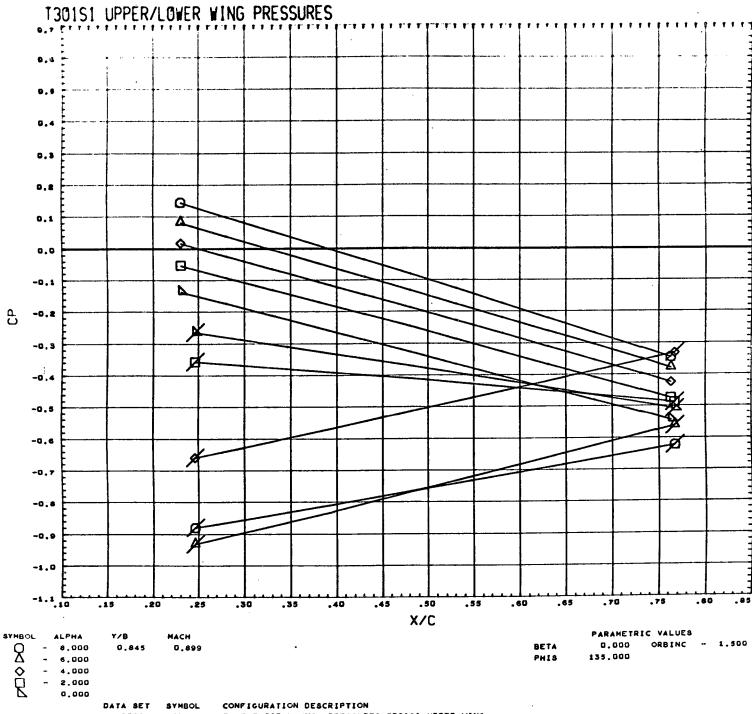


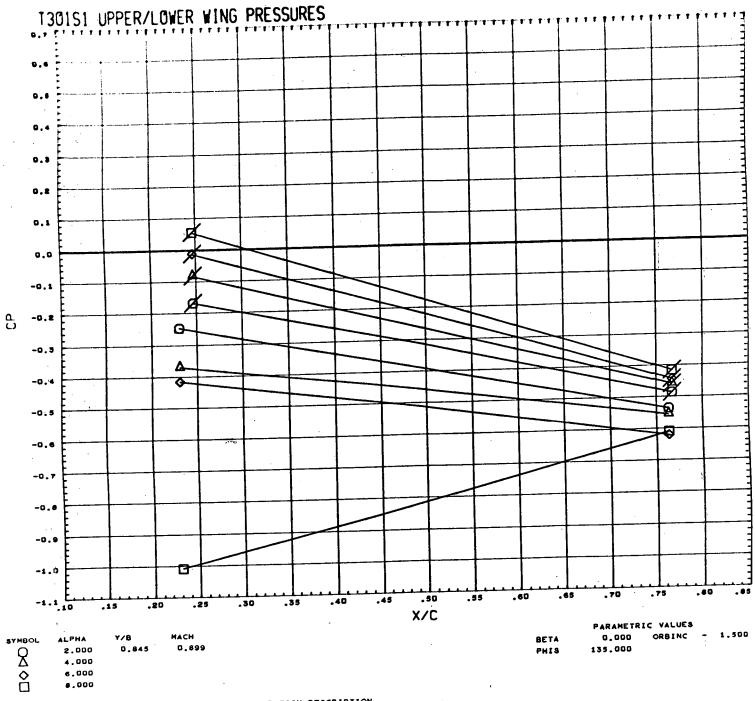


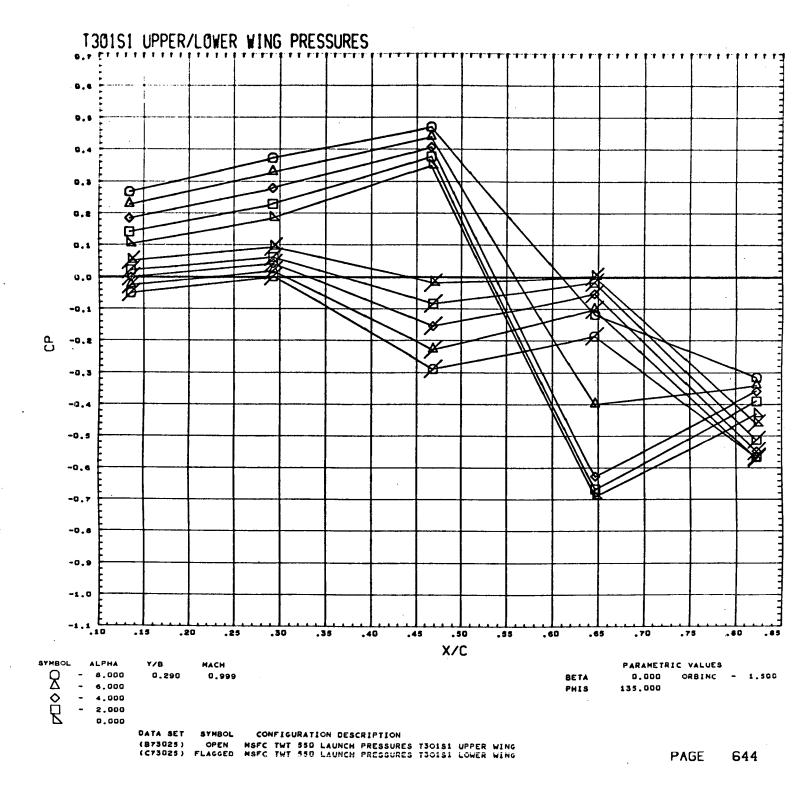


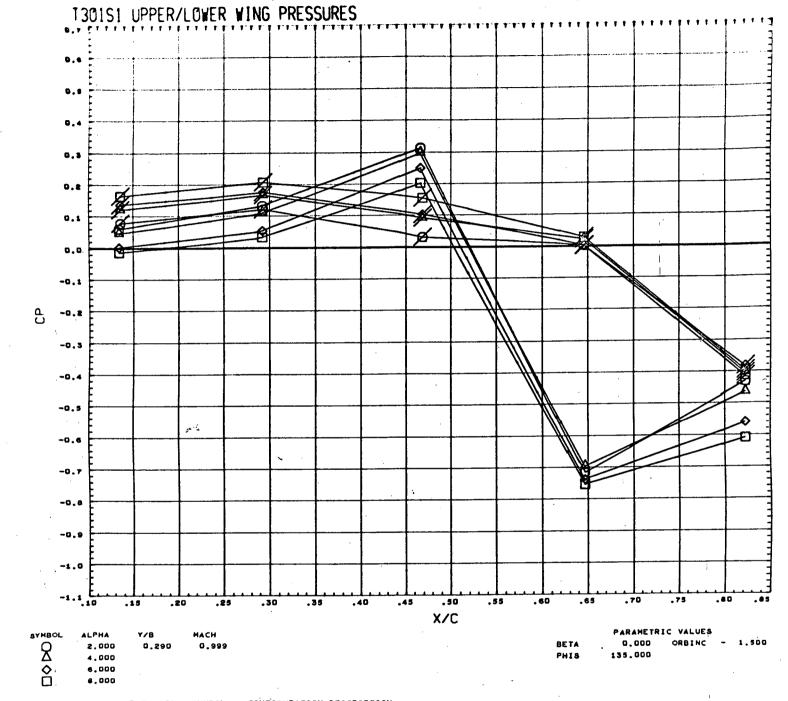
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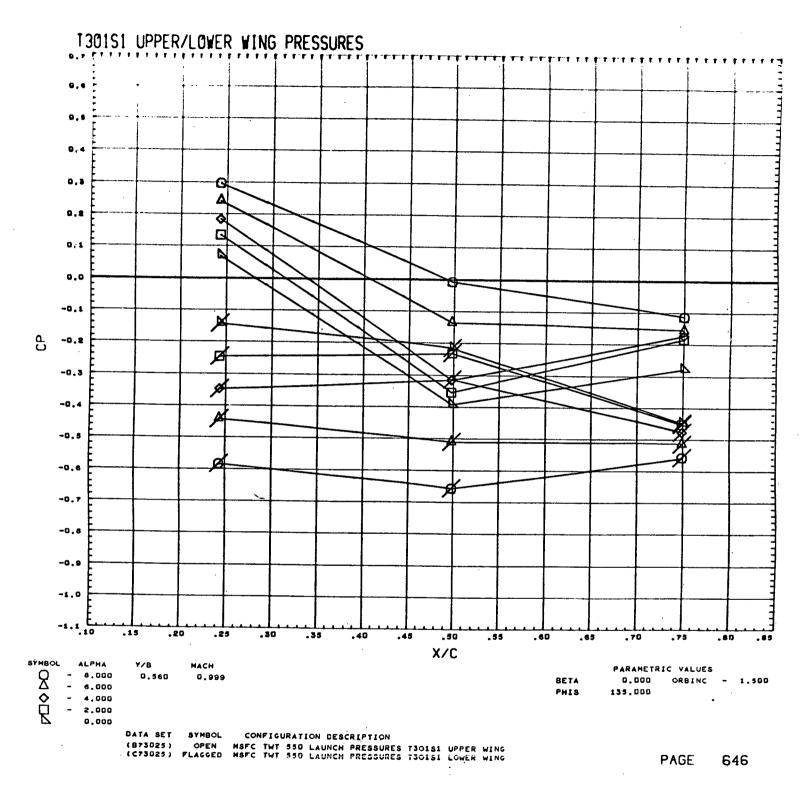


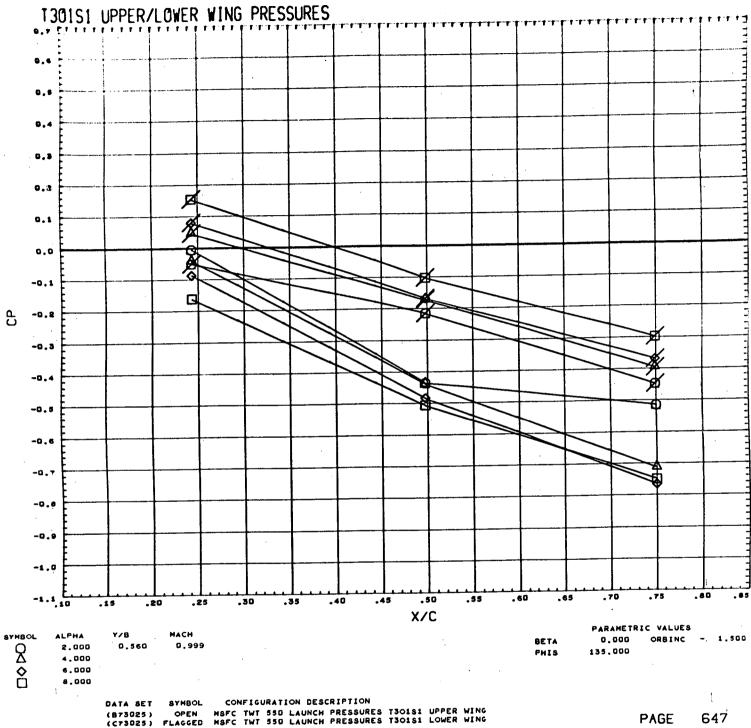


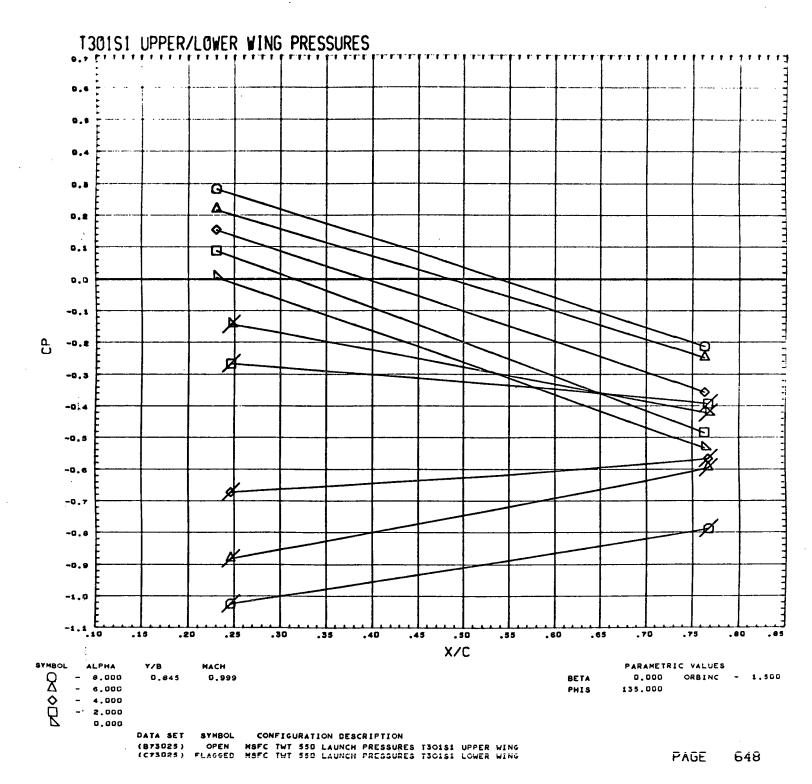


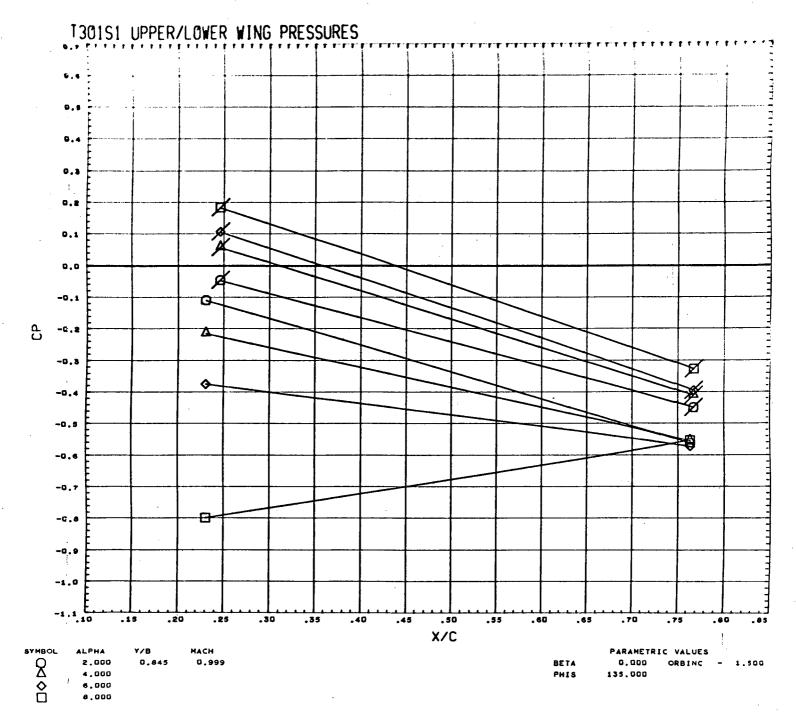






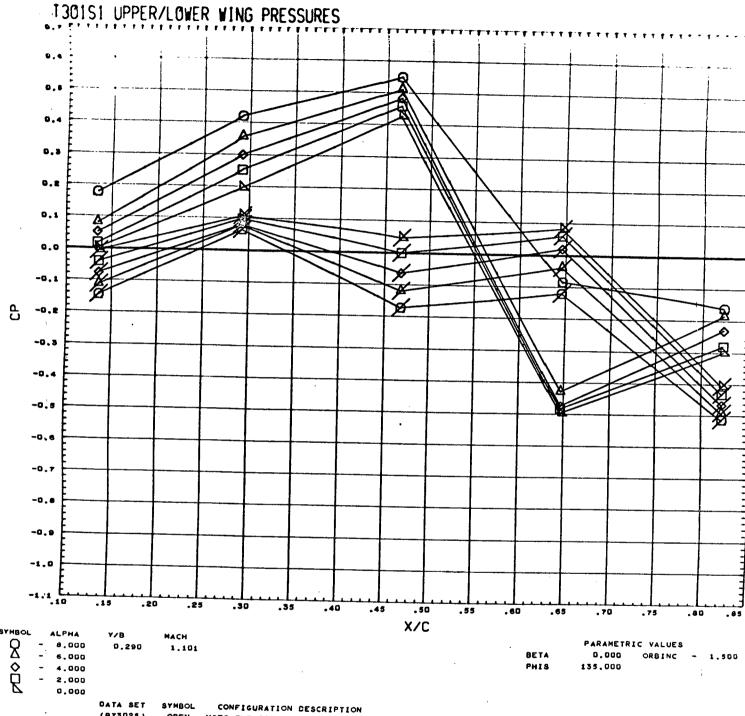


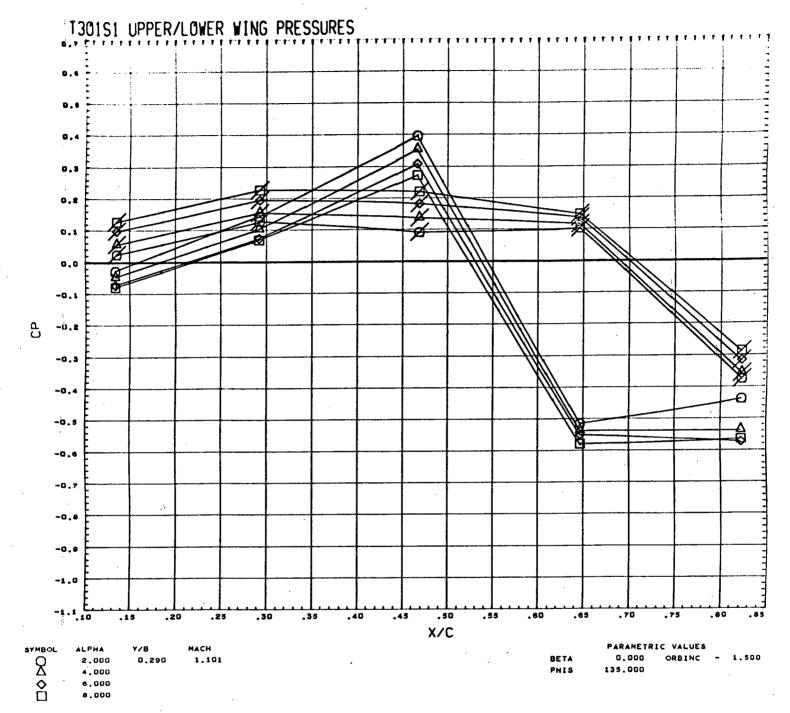


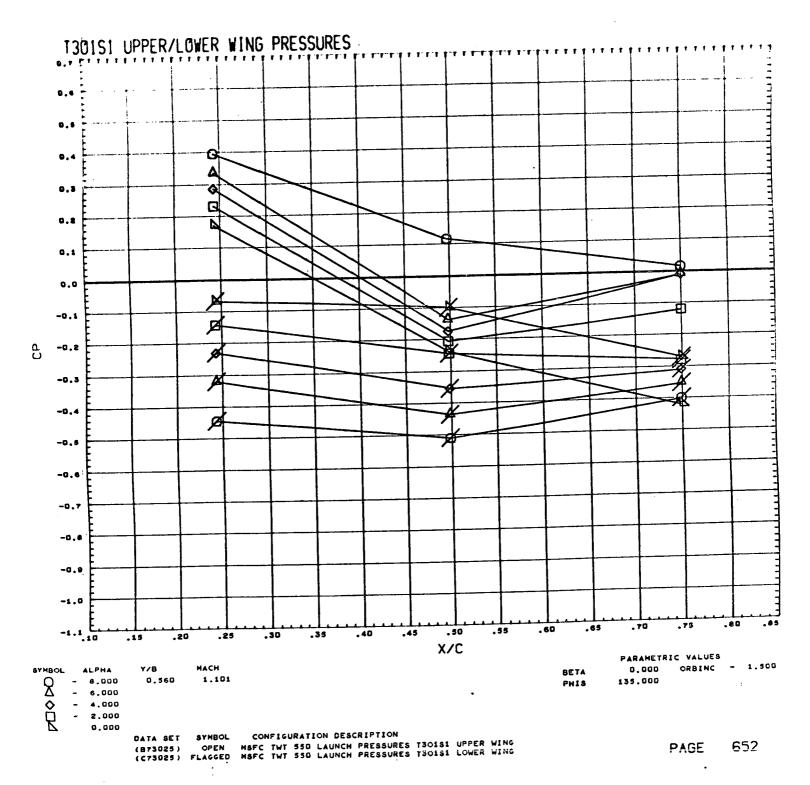


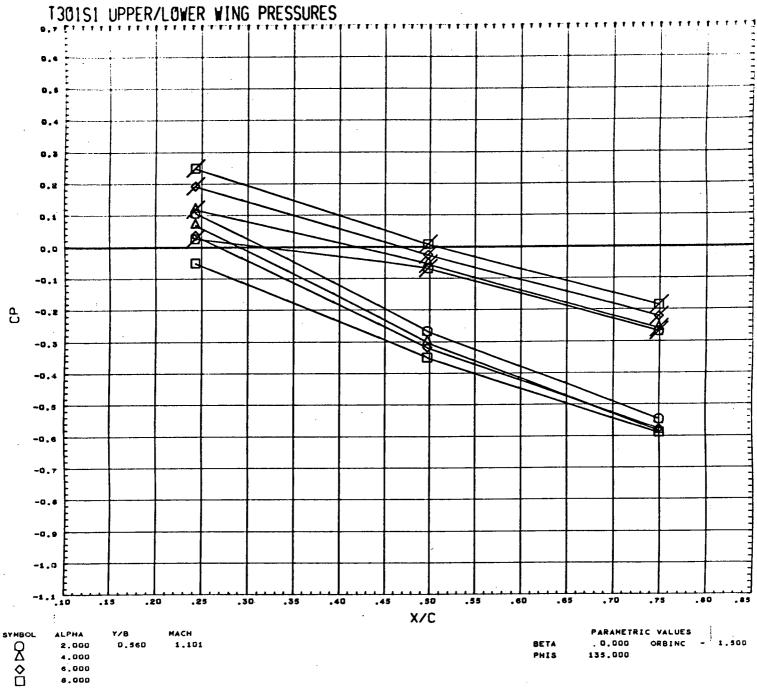
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Marin of

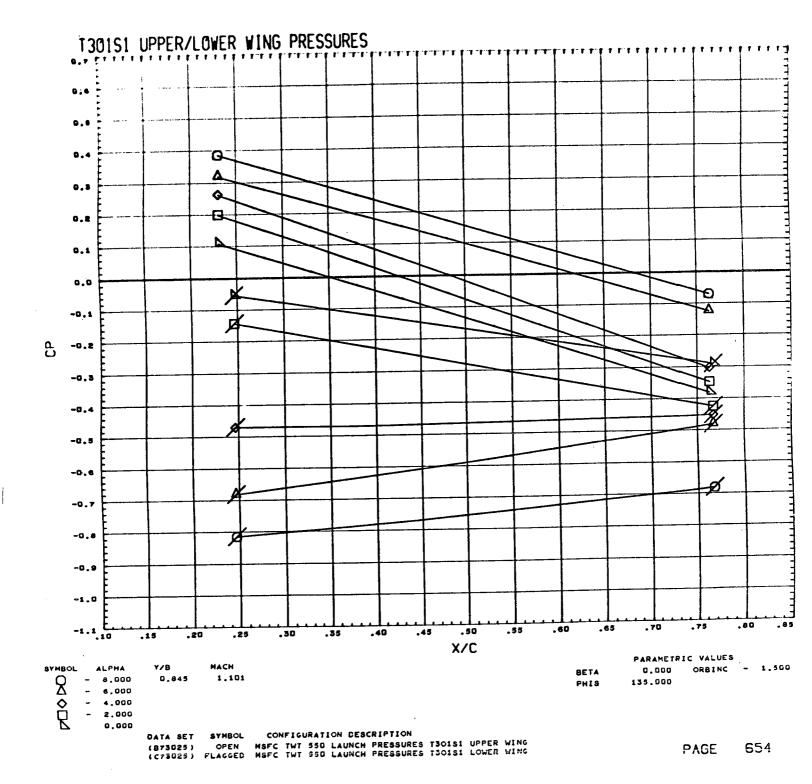




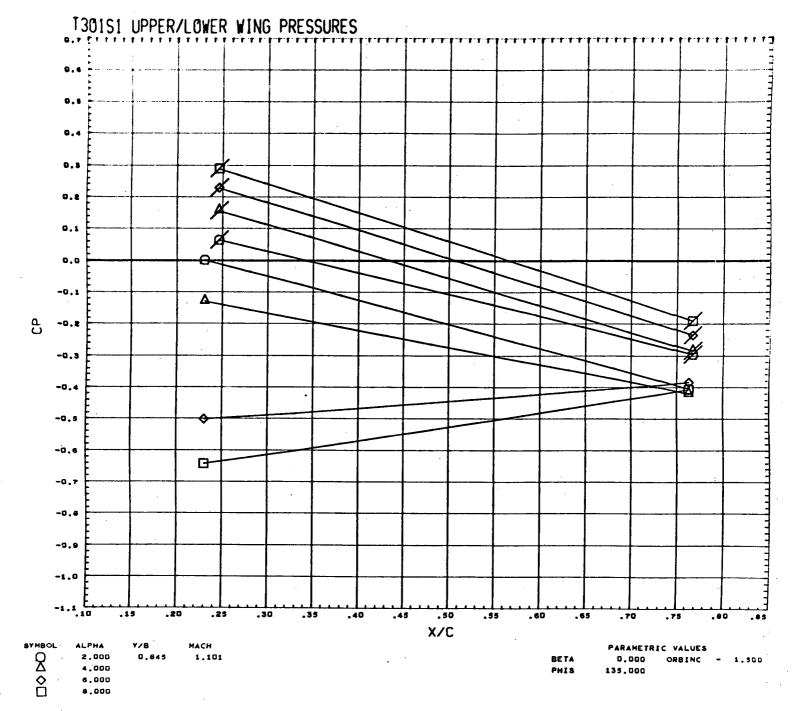




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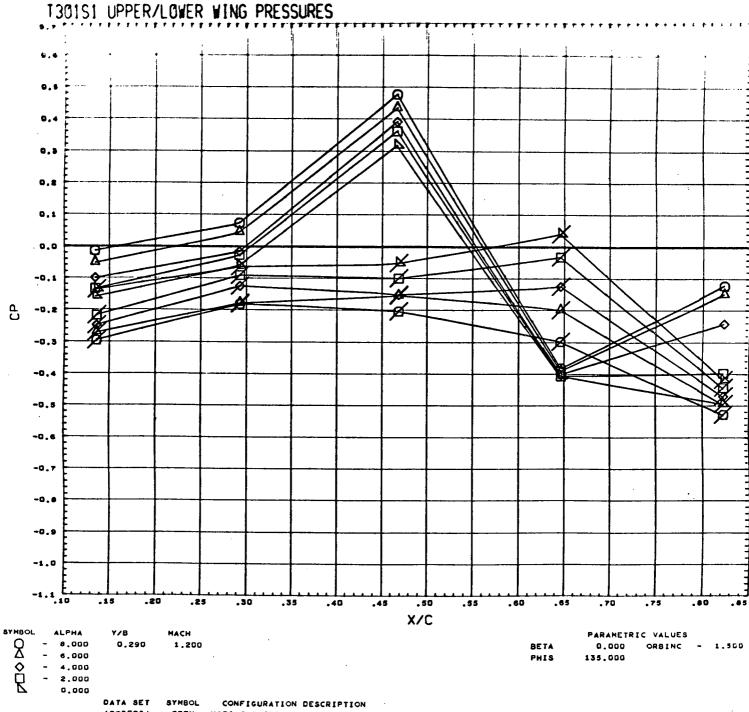


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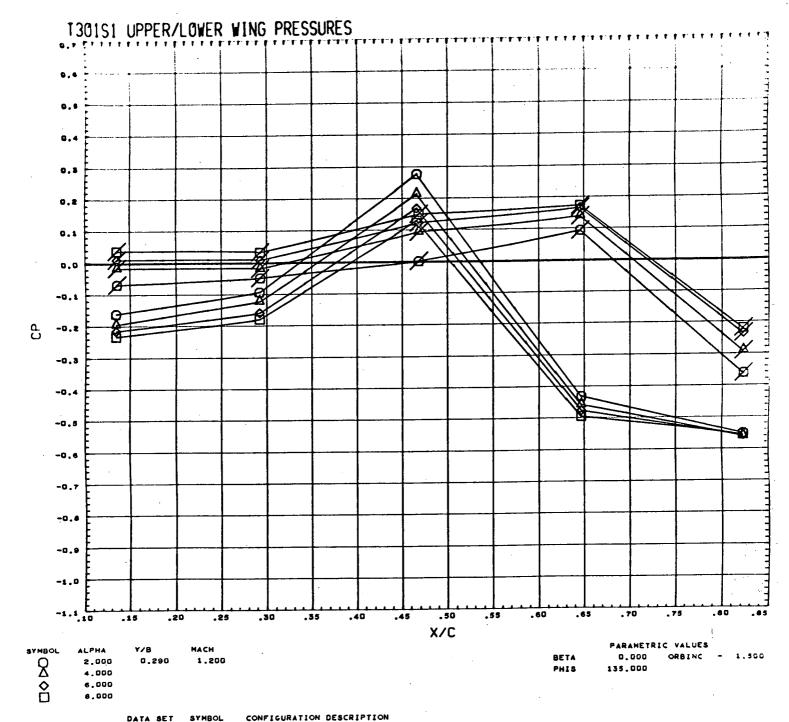


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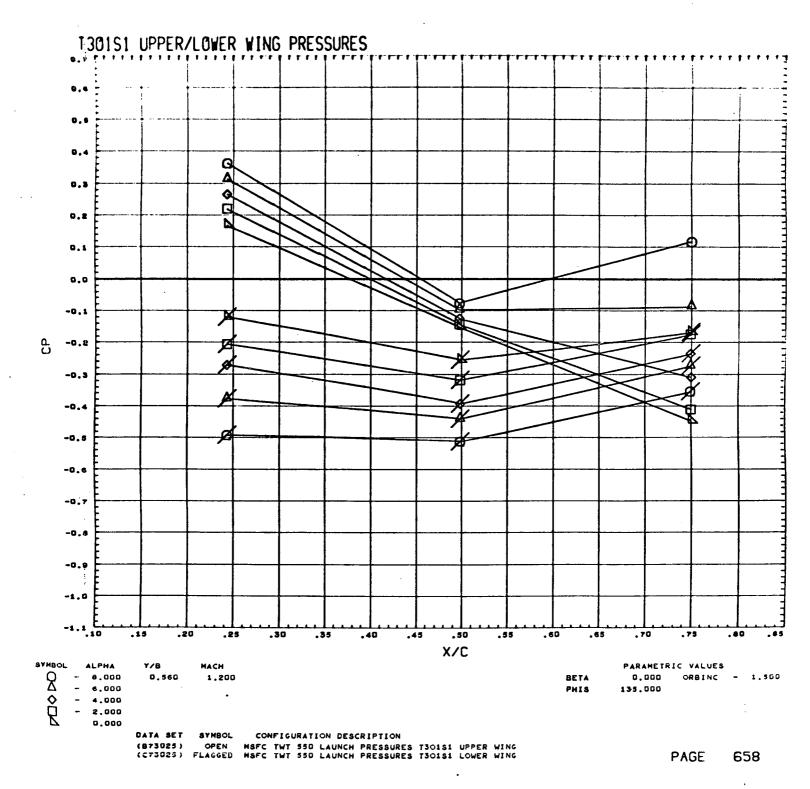


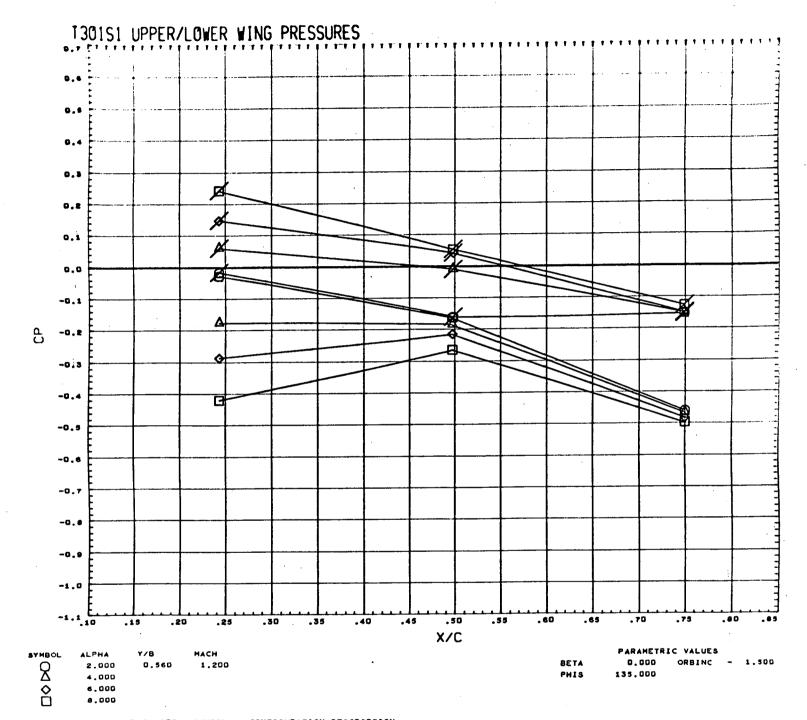
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(873025) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73025) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

PAGE 657 .

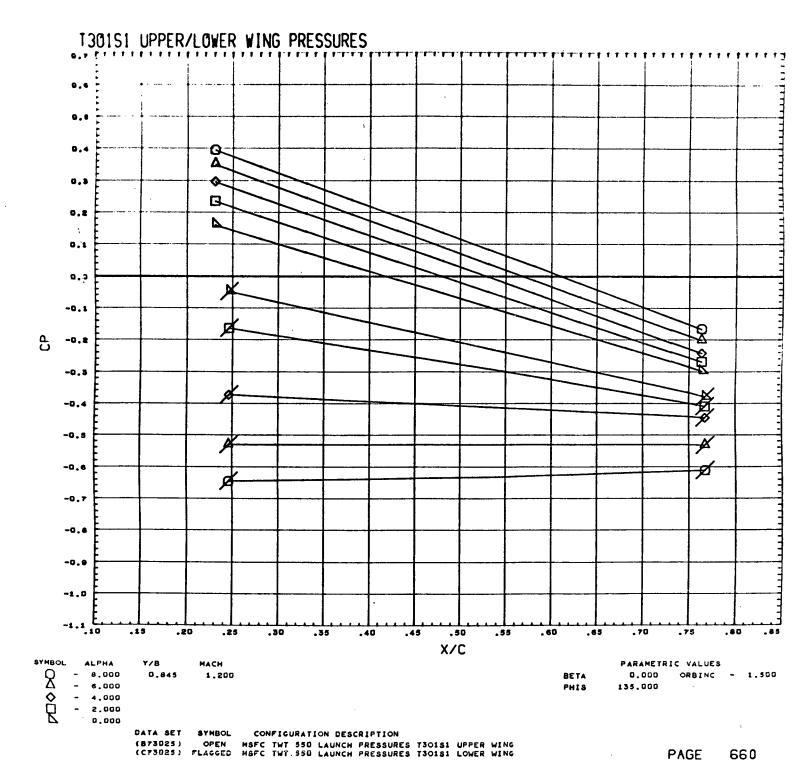




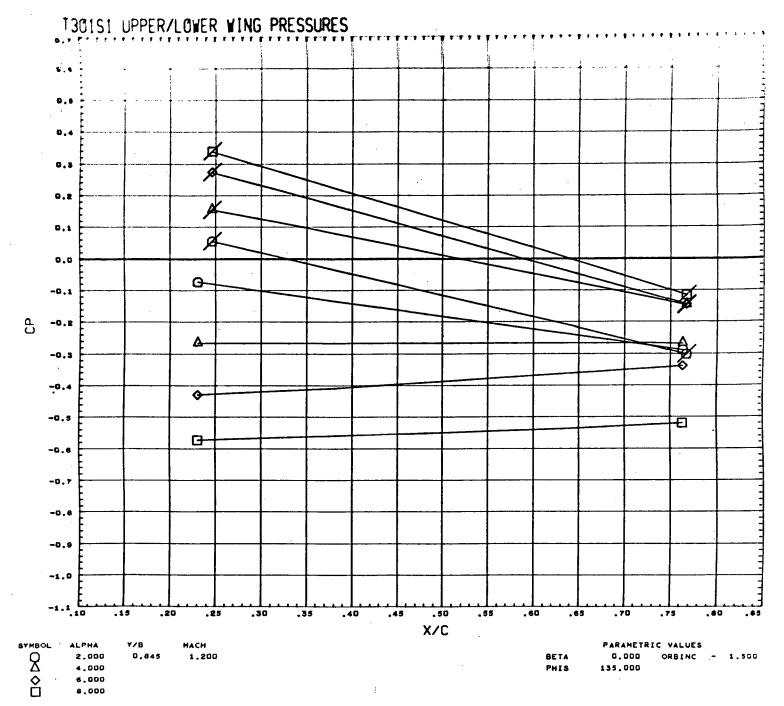
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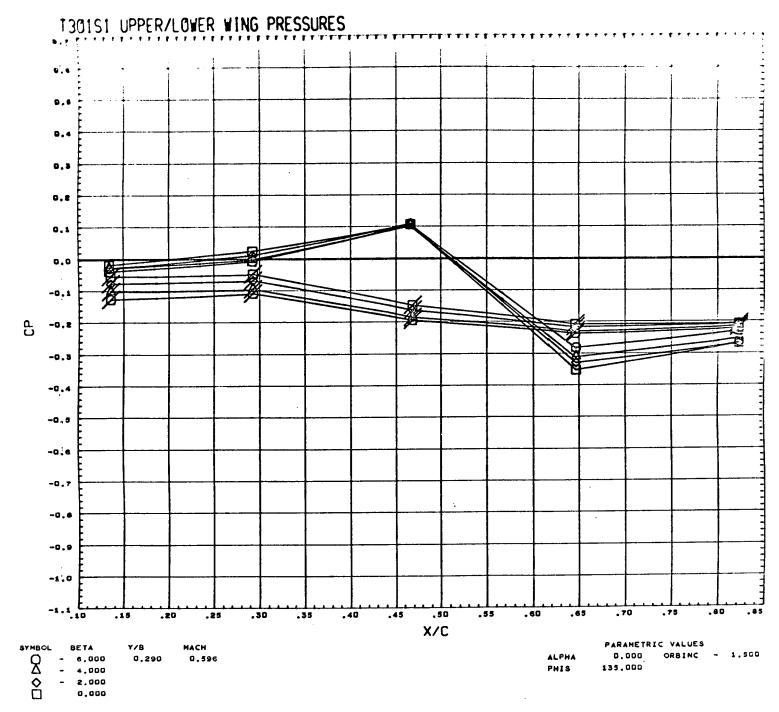
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1.00

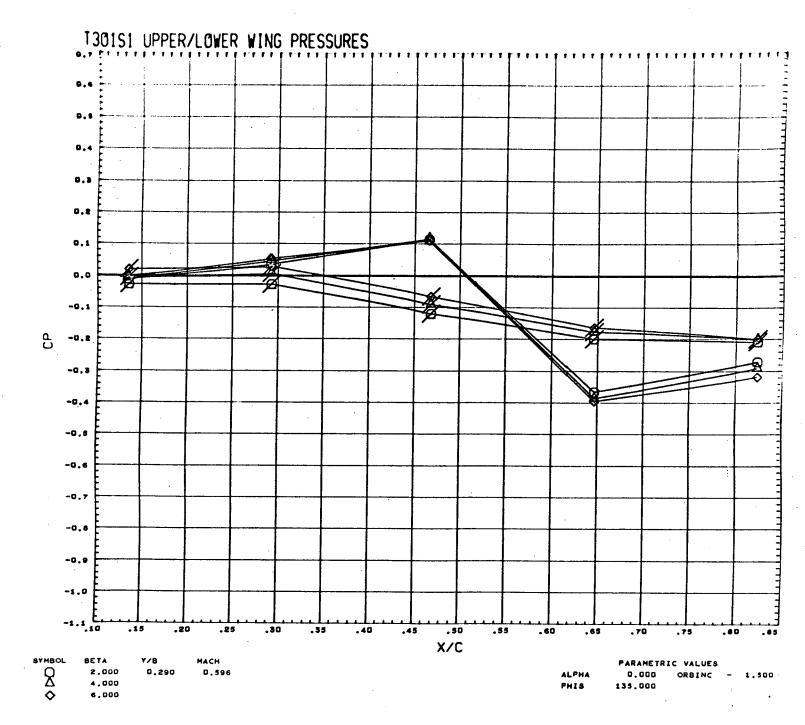


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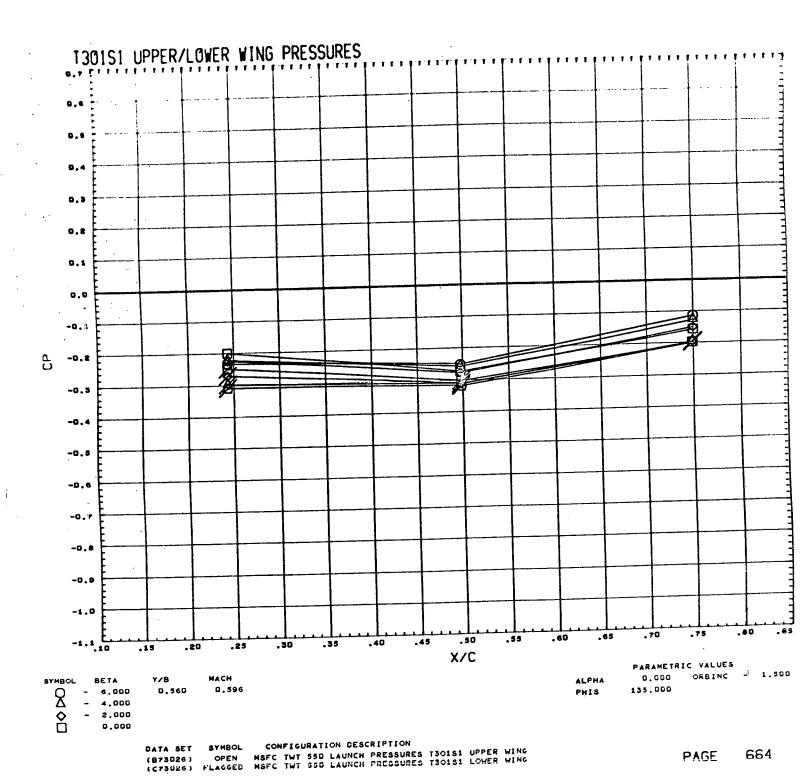


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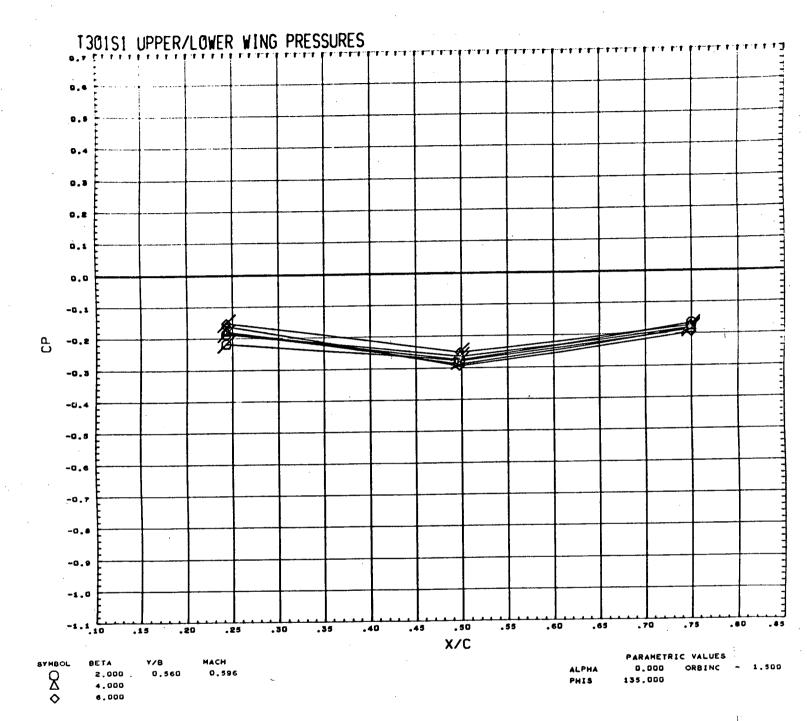
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DATA SET SYMBOL CONFIGURATION DESCRIPTION
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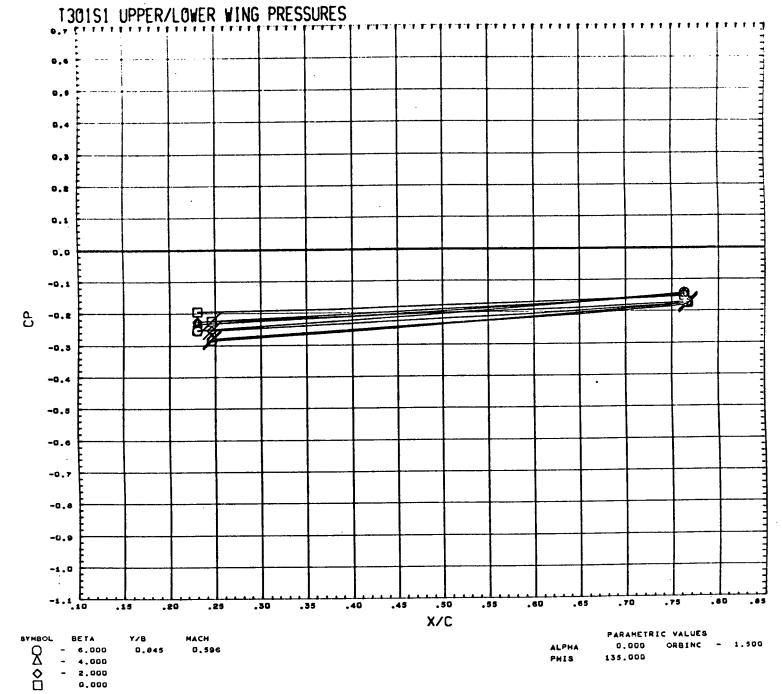


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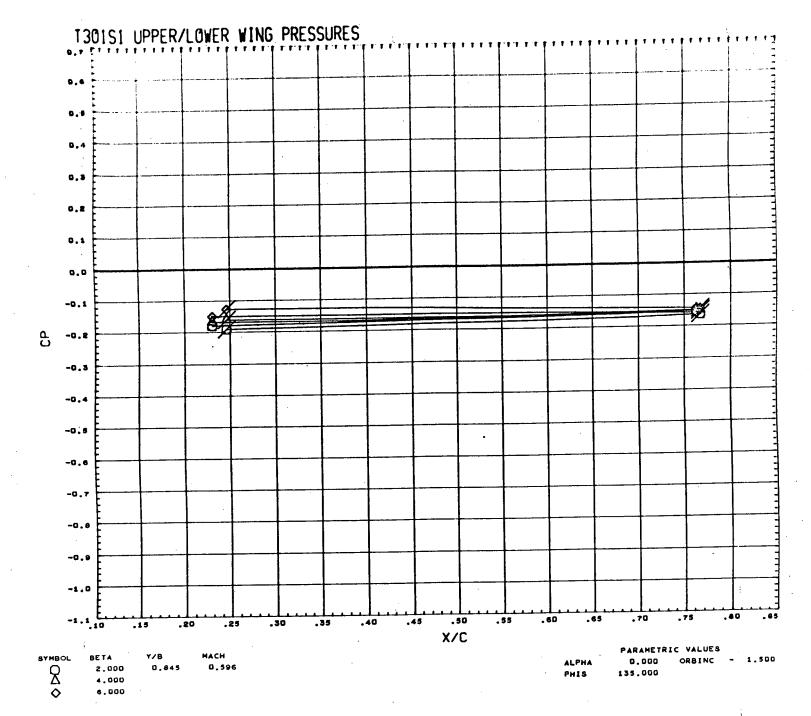


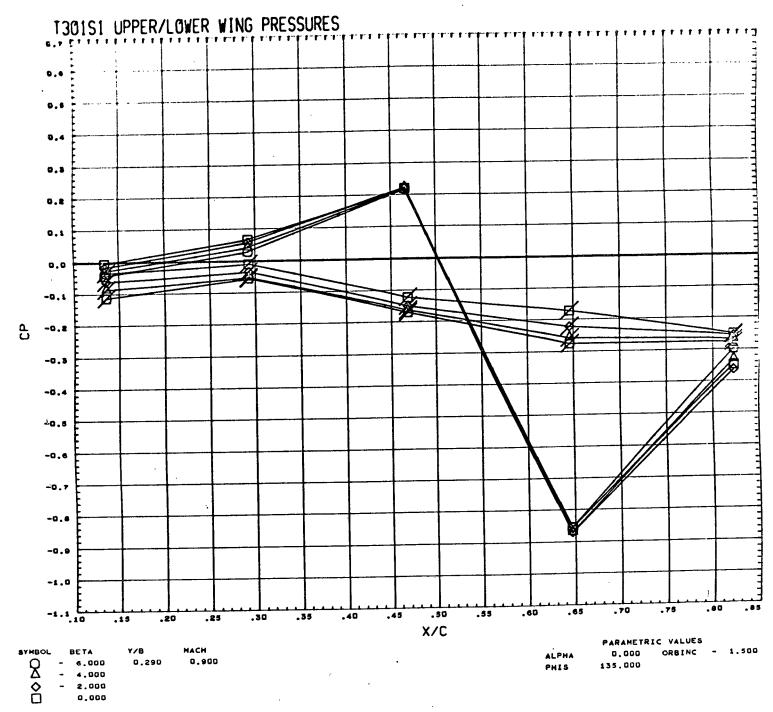


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(C73D26) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING



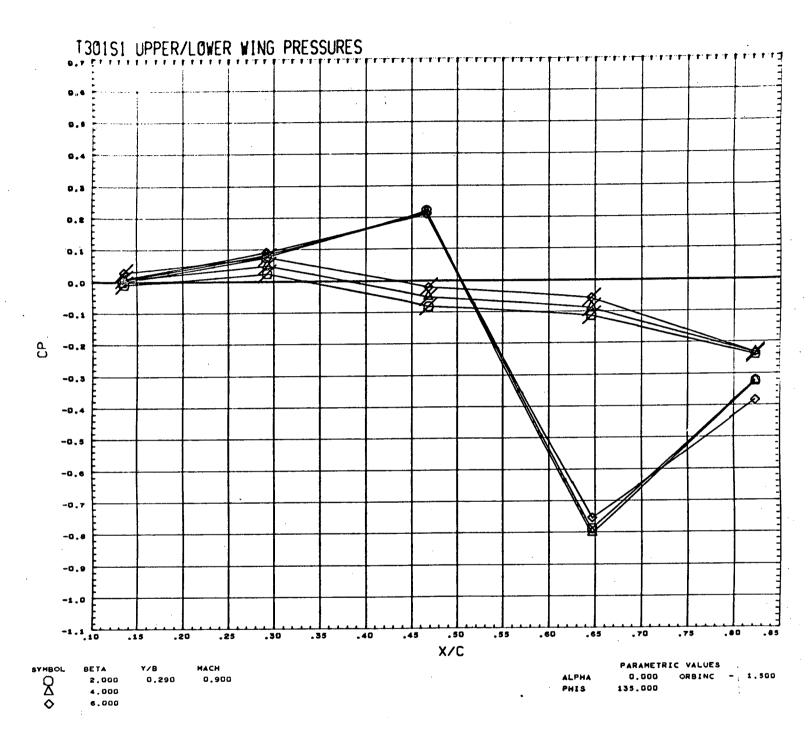


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73026) FLAGGED: MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING

PAGE 668

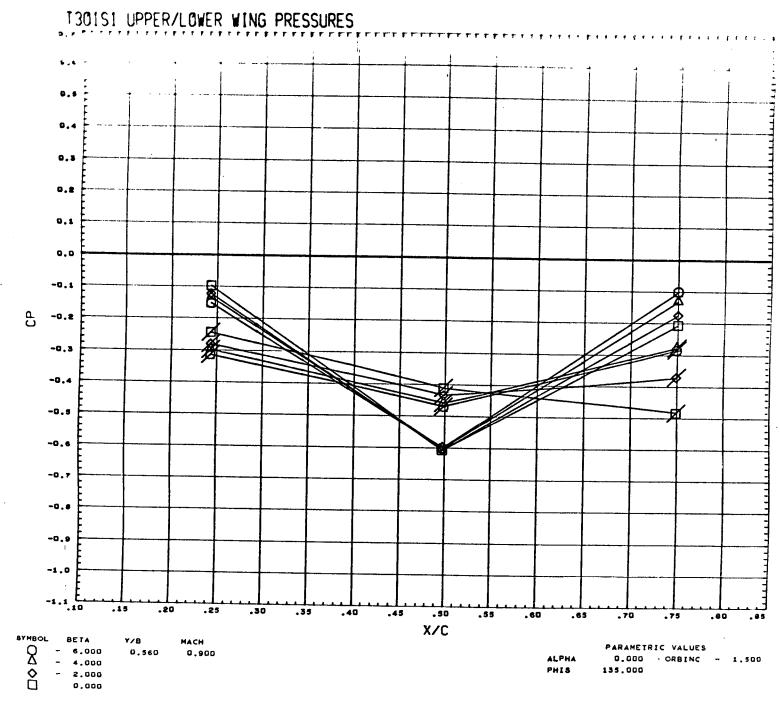
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DATA SET SYMBOL CONFIGURATION DESCRIPTION

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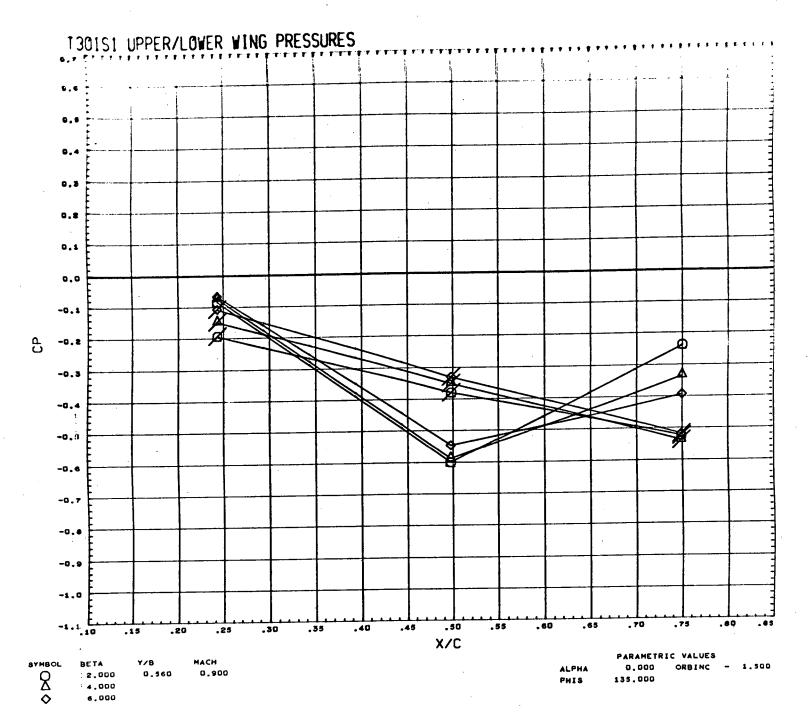
(C73026) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING



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(C73026) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

PAGE 670

f = i,

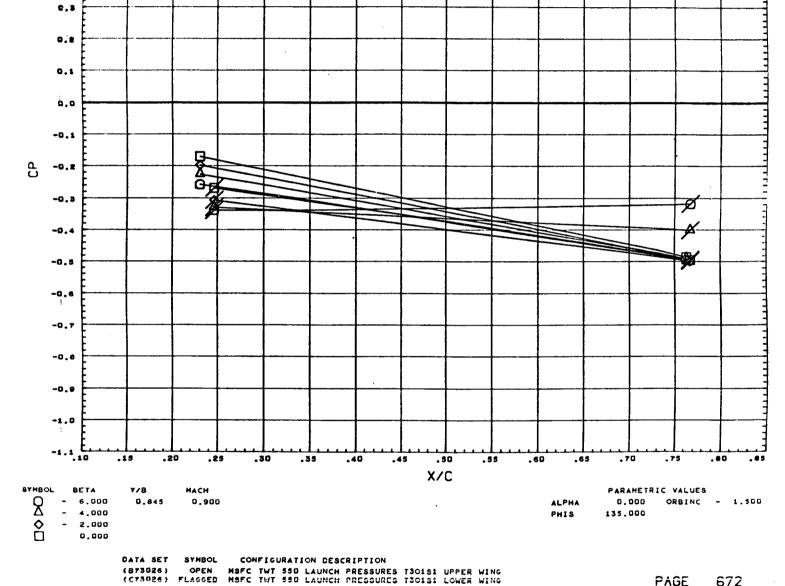


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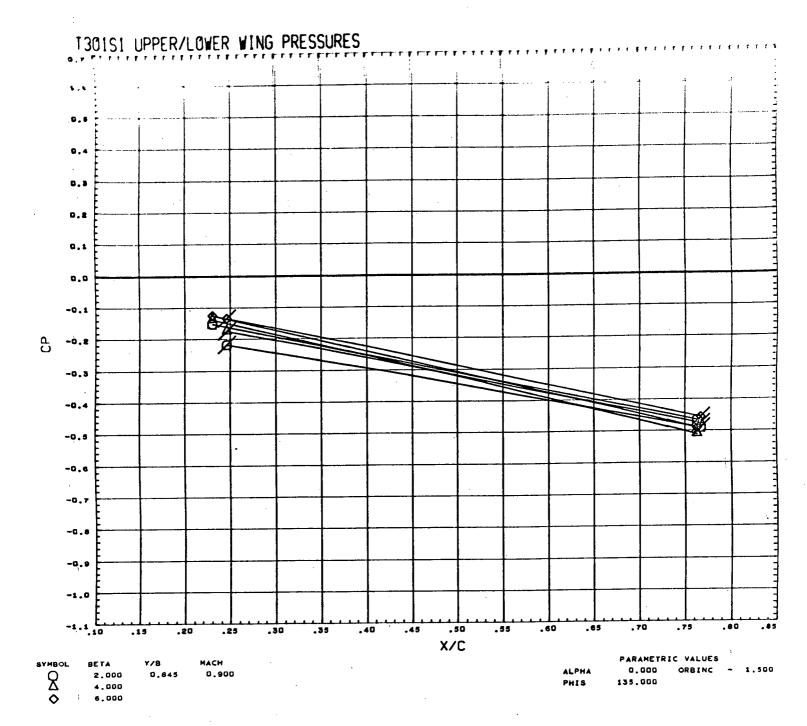
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(C73026) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

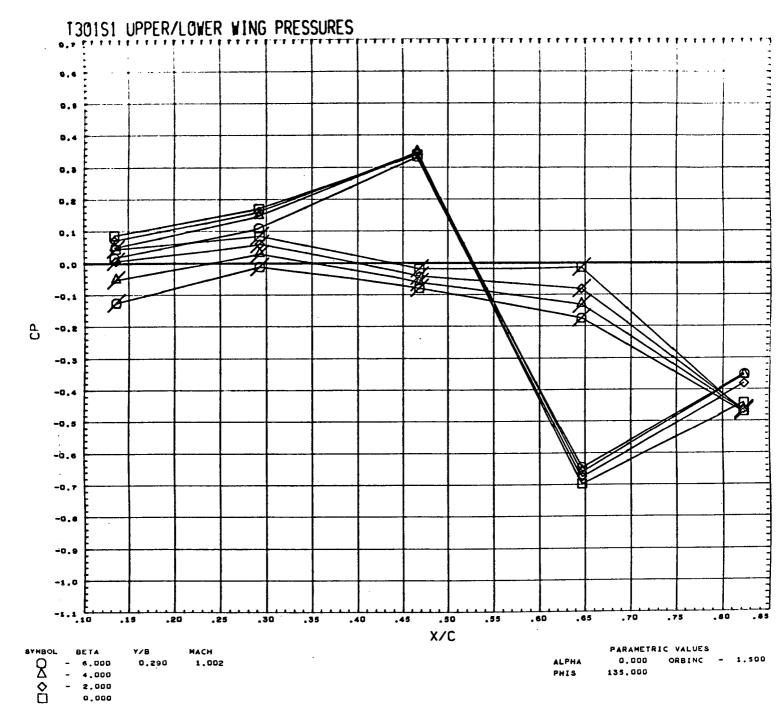
PAGE 672



T301S1 UPPER/LOWER WING PRESSURES

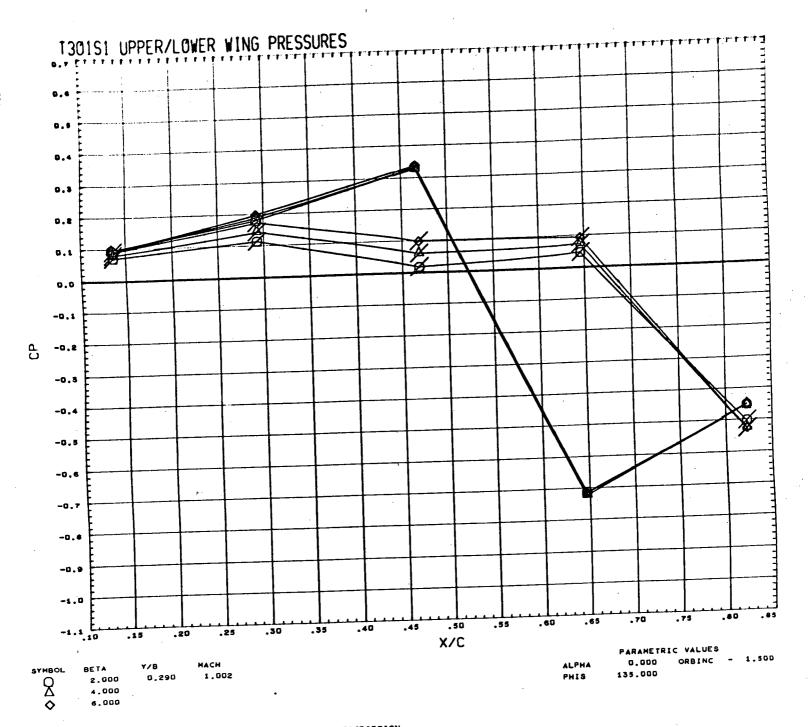


DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73026) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T301S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873026) OPEN MSFC TWT 55D LAUNCH PRESSURES T301SI UPPER WING (C73026) FLAGGED H8FC TWT 55D LAUNCH PRESSURES T301SI LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73026) OPEN MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

(C73026) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T301S1 LOWER WING

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PAGE | 675

-0.1 -0.3 -1.0 .80 .20 X/C SYMBOL | BETA PARAMETRIC VALUES Y/B MACH ORBINC - 1.500 0400 ALPHA 0.000 0.560 6.000 1.002 PHIS 135,000 4.000 2.000 0.000

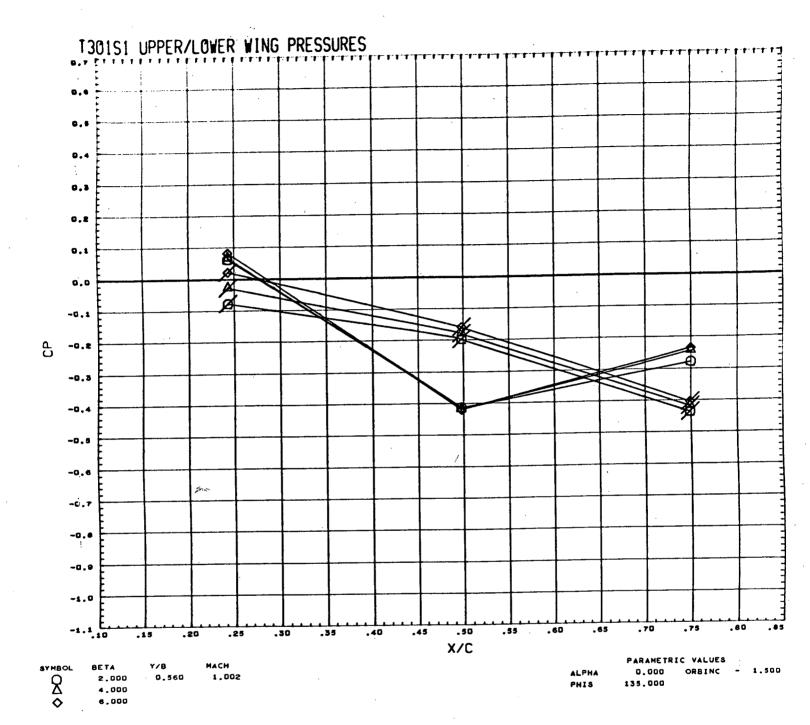
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CONFIGURATION DESCRIPTION (873026) OPEN MSFC TWT 550 LAUNCH PRESSURES T30181 UPPER WING (C73020) FLAGGED HOFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

1301S1 UPPER/LOWER WING PRESSURES

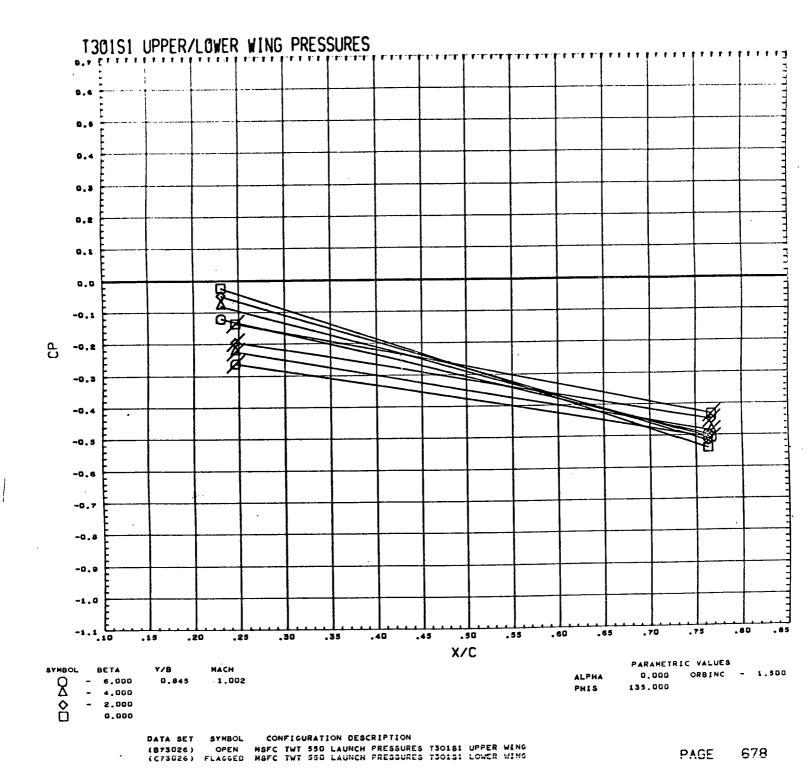
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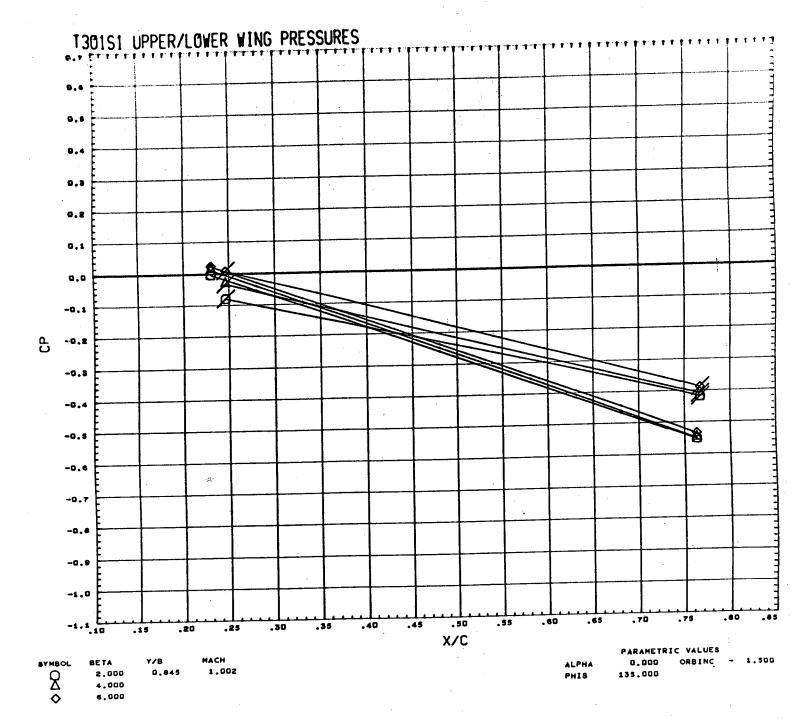


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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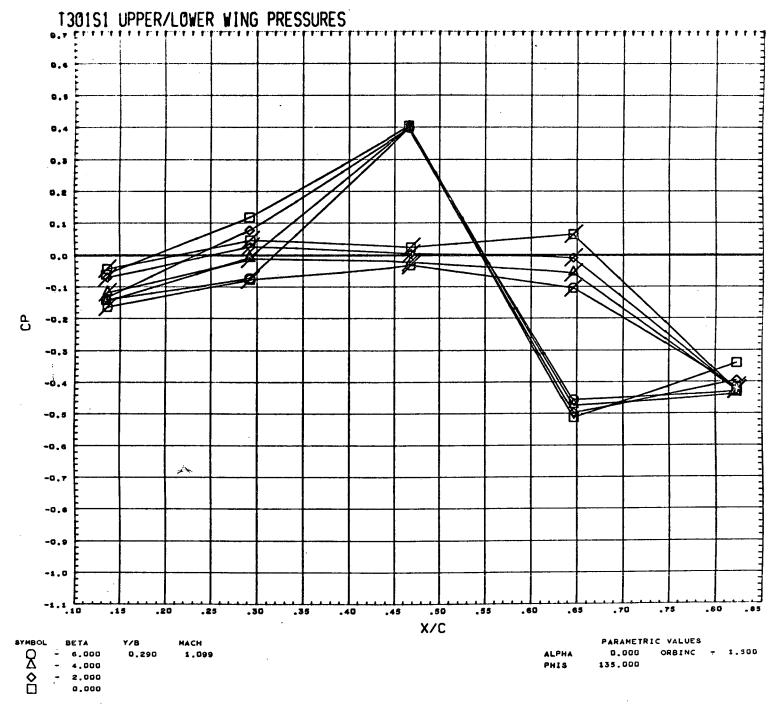




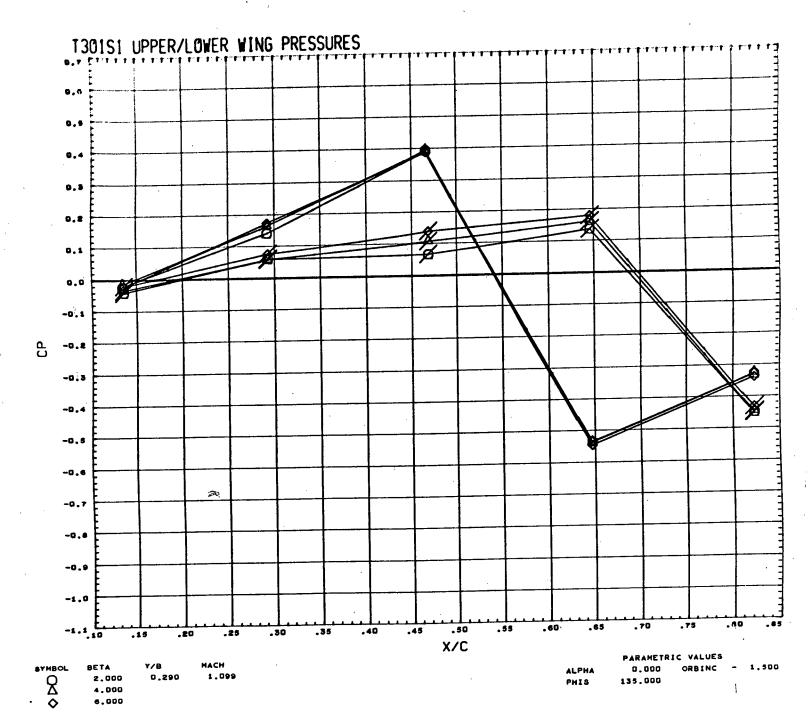
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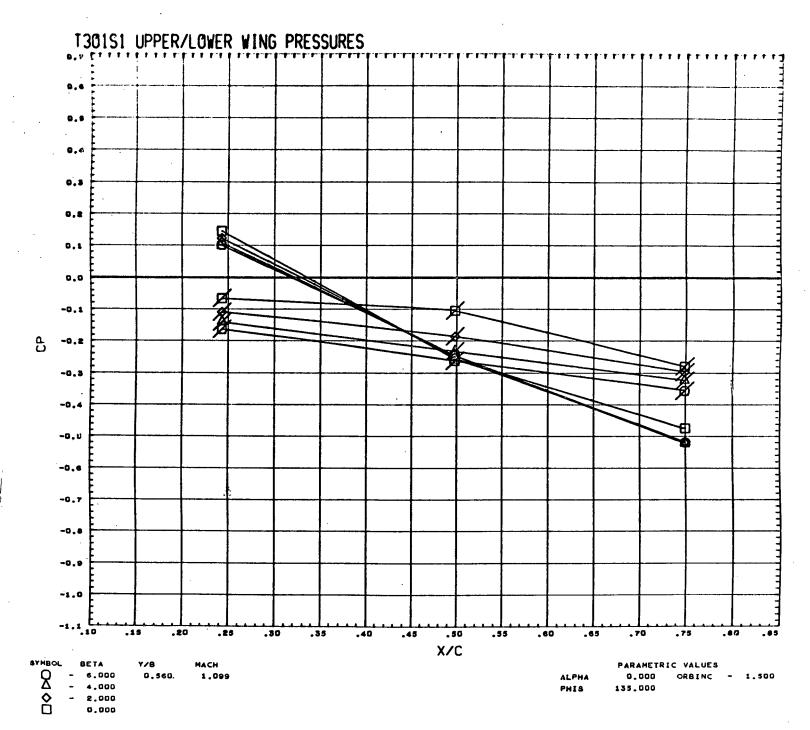
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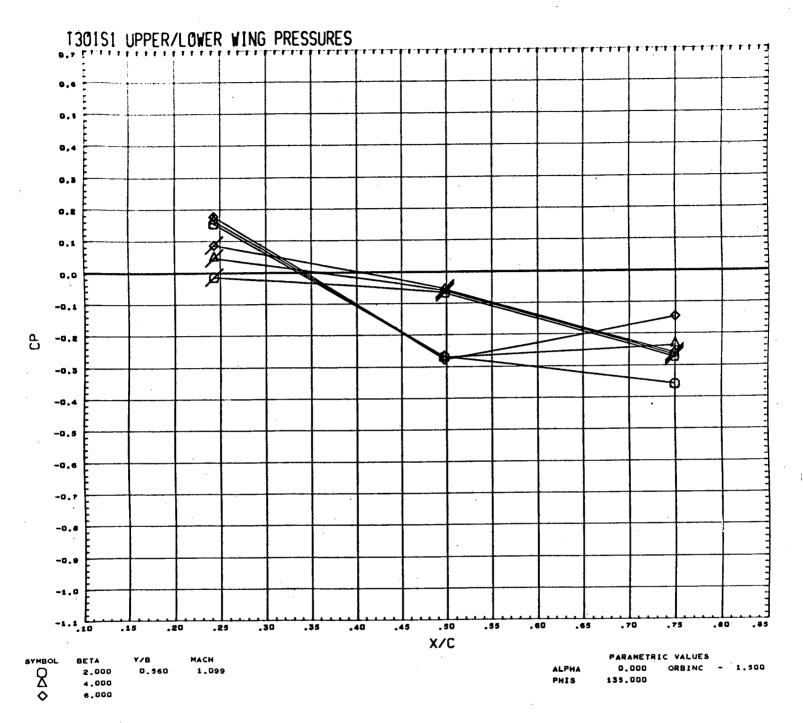
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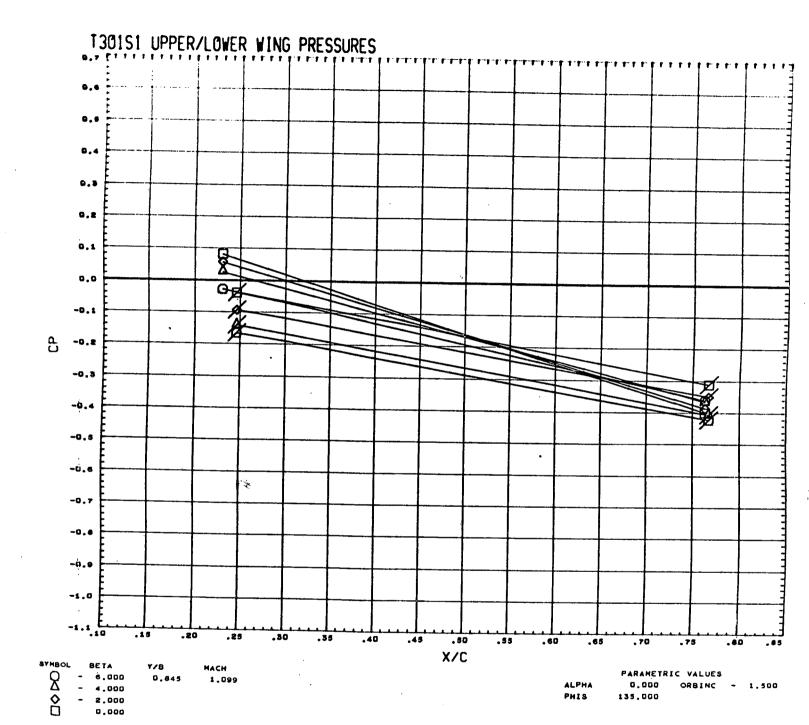
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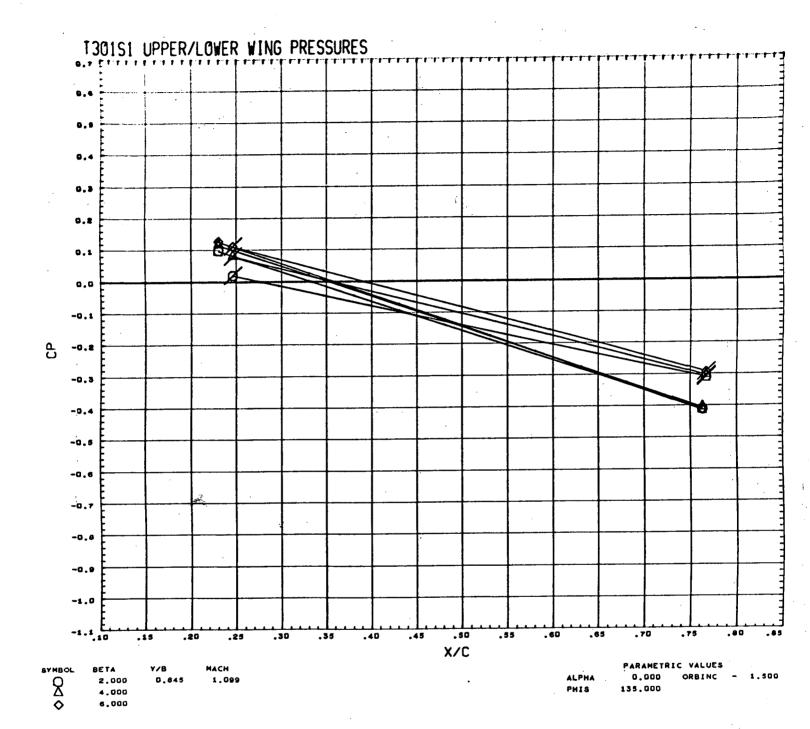
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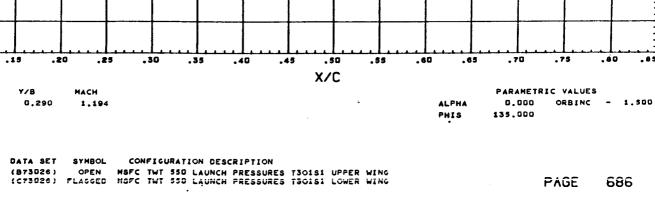
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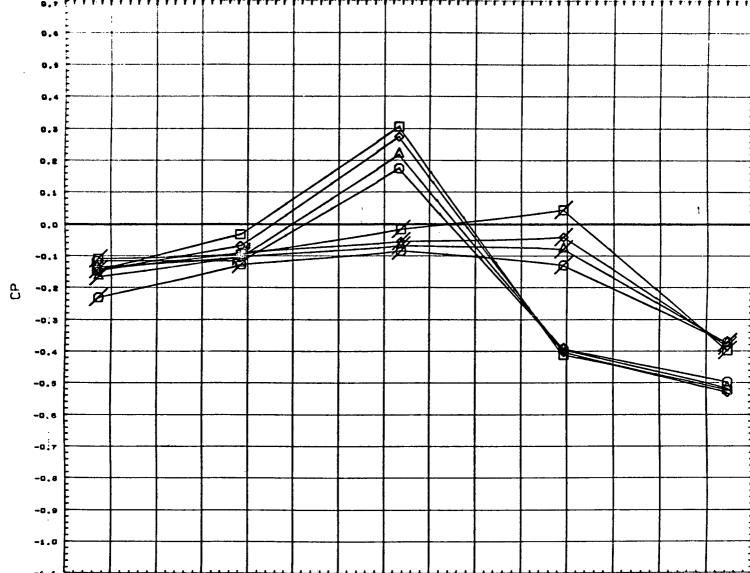
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DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73026) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30181 LOWER WING

PAGE 686





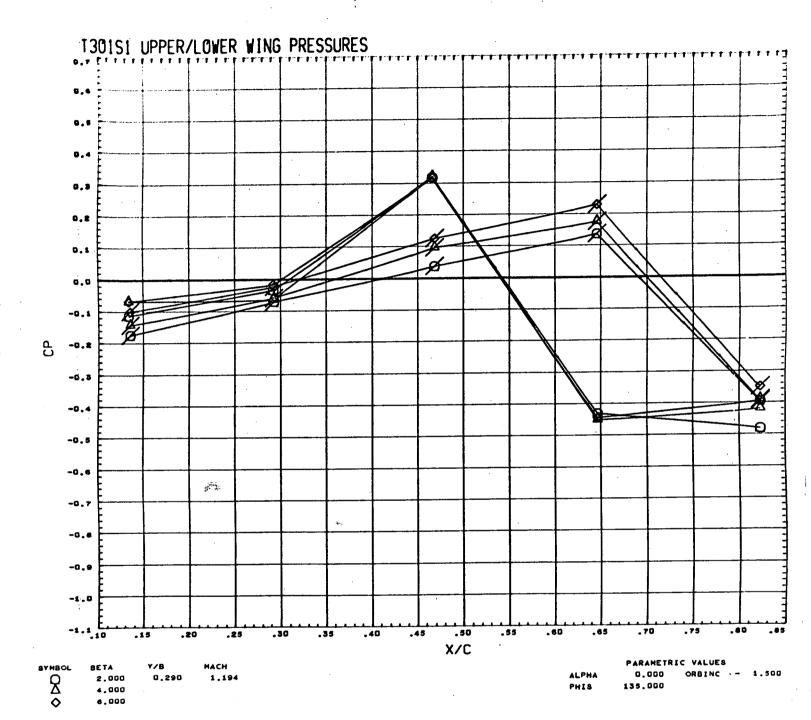
1301S1 UPPER/LOWER WING PRESSURES

2000

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- 2.000 0.000

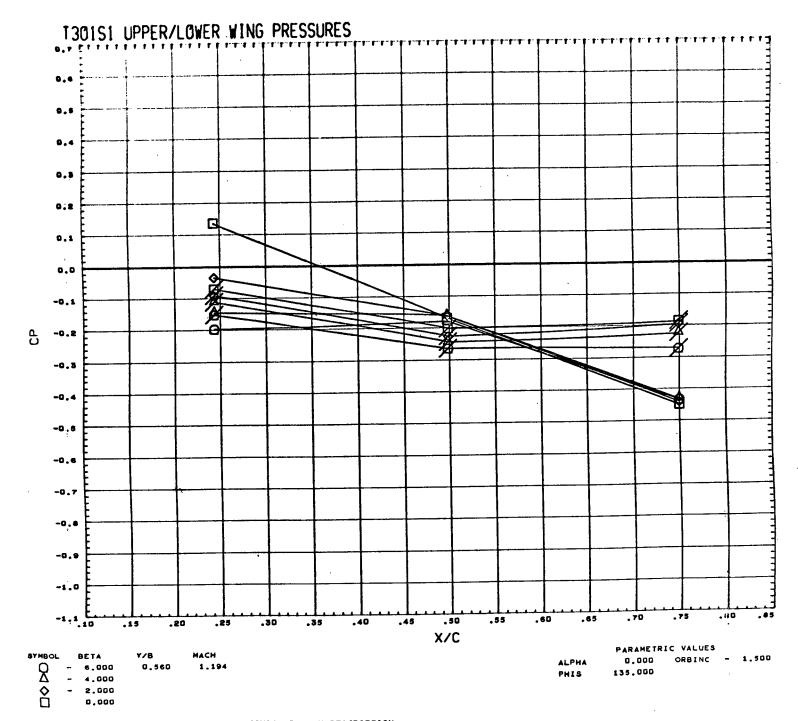
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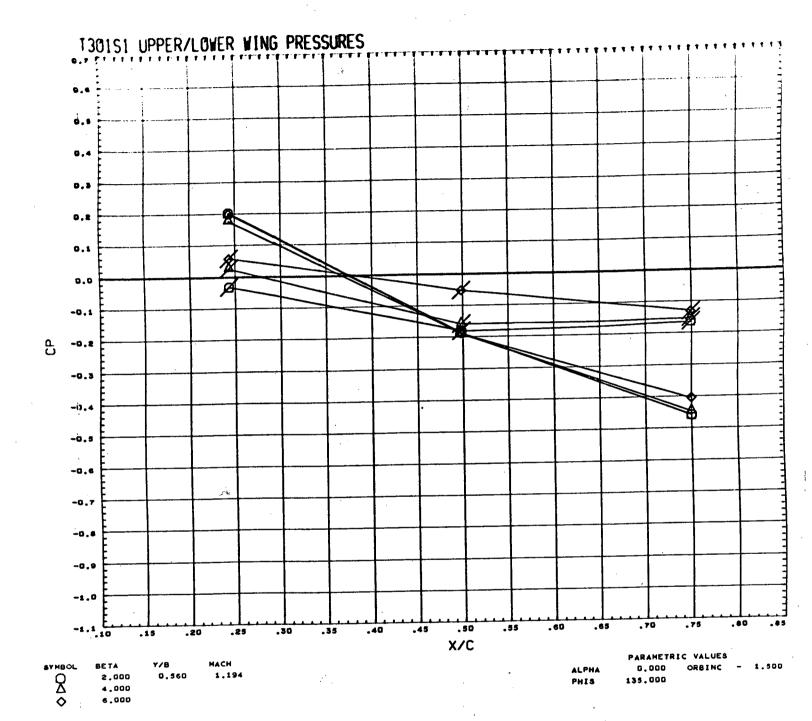
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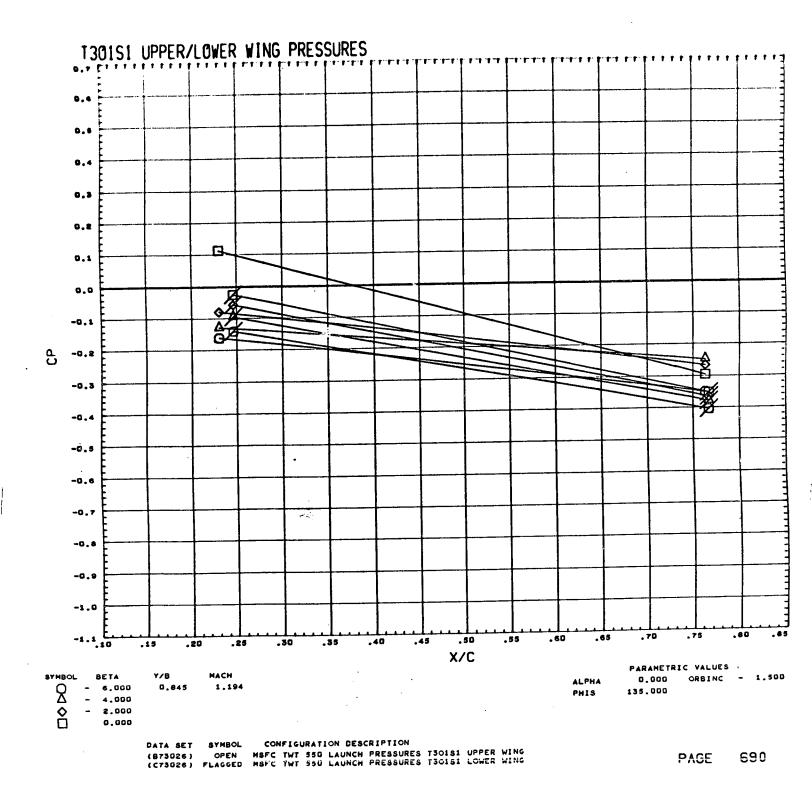
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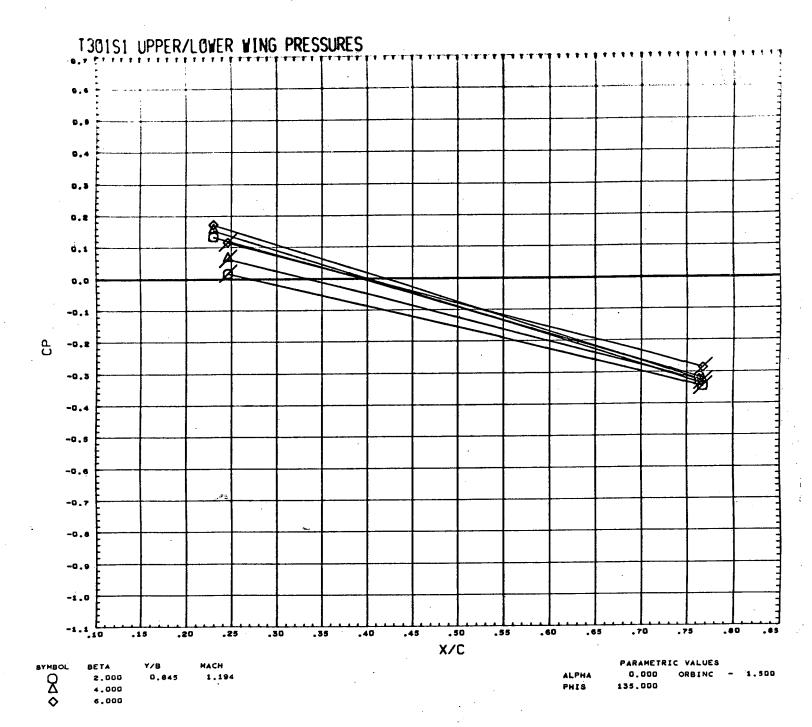


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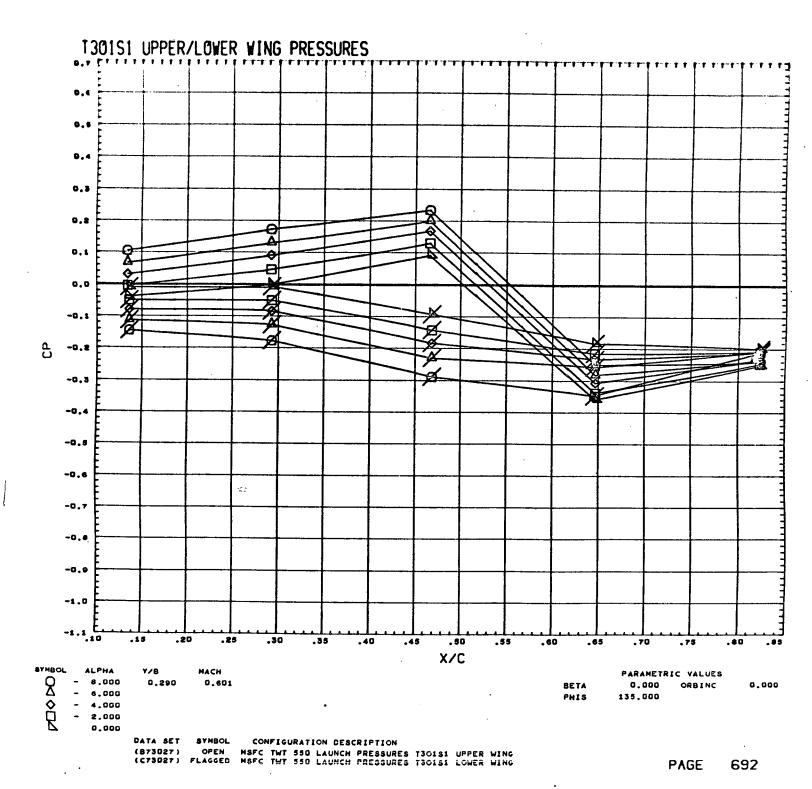


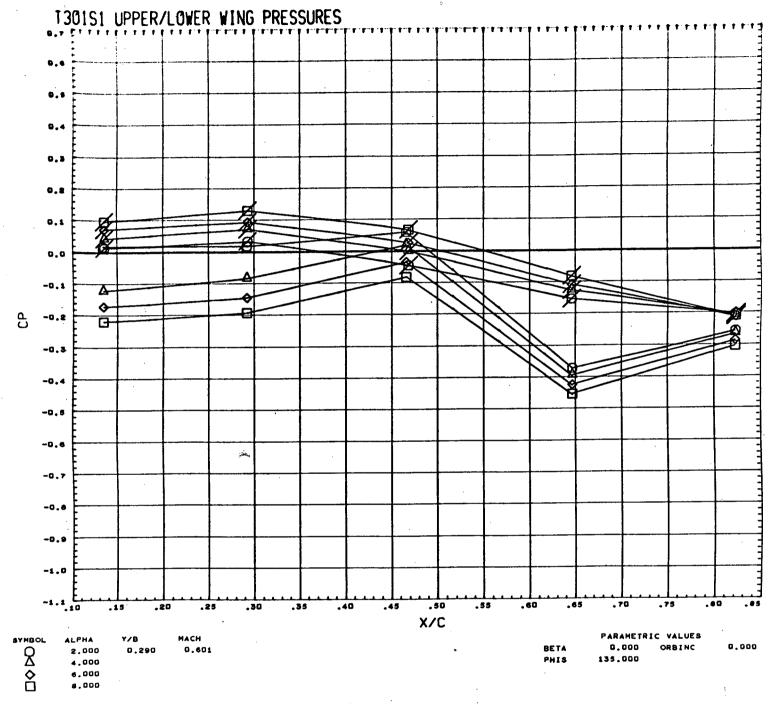


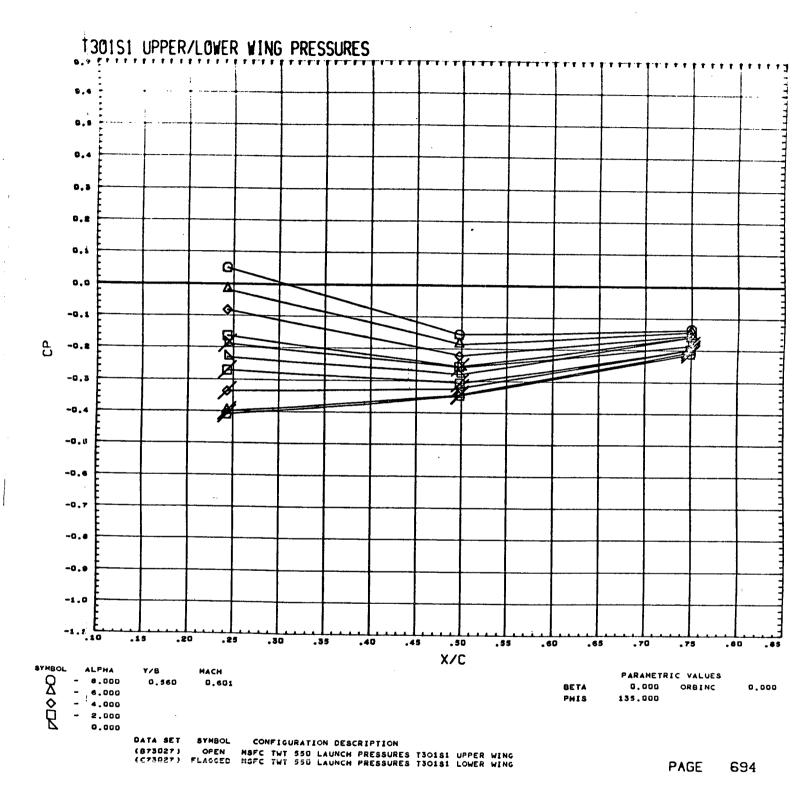


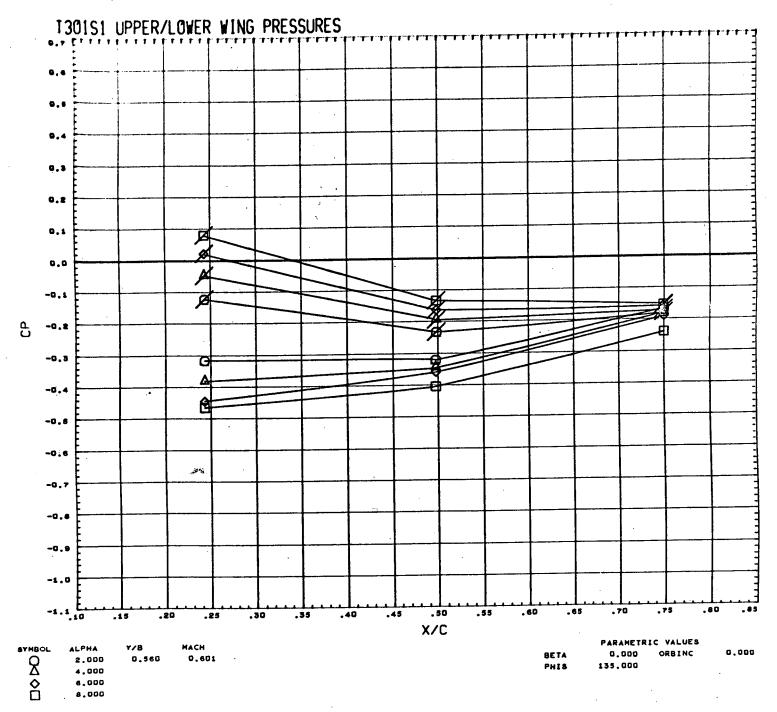
PAGE 691

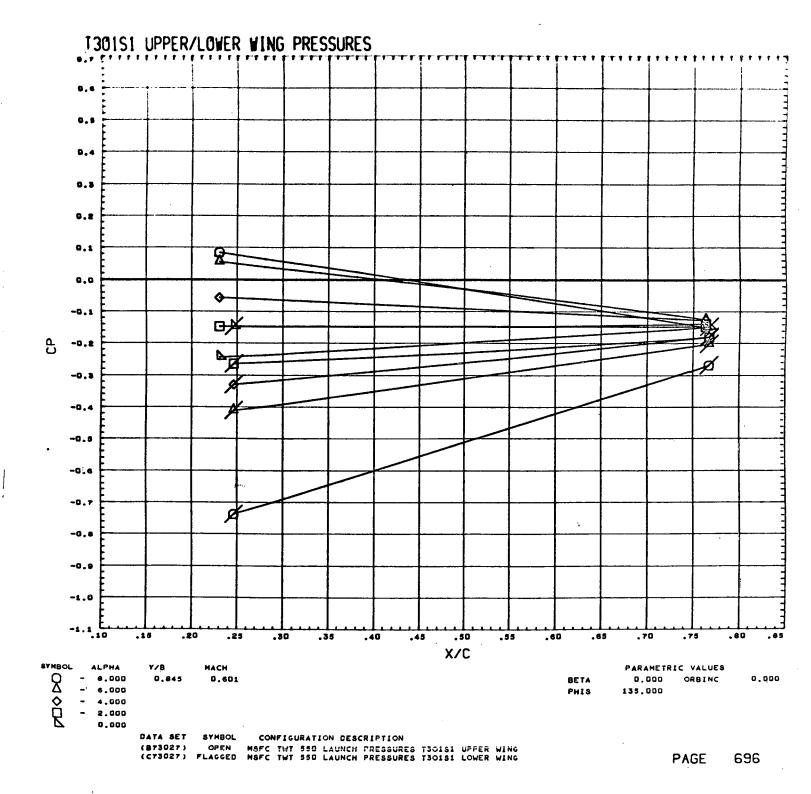
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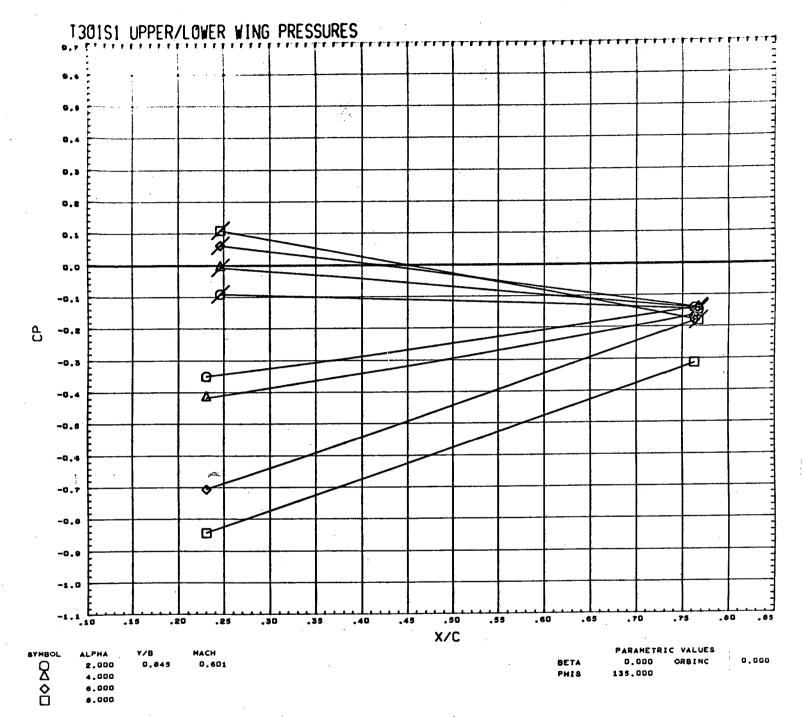


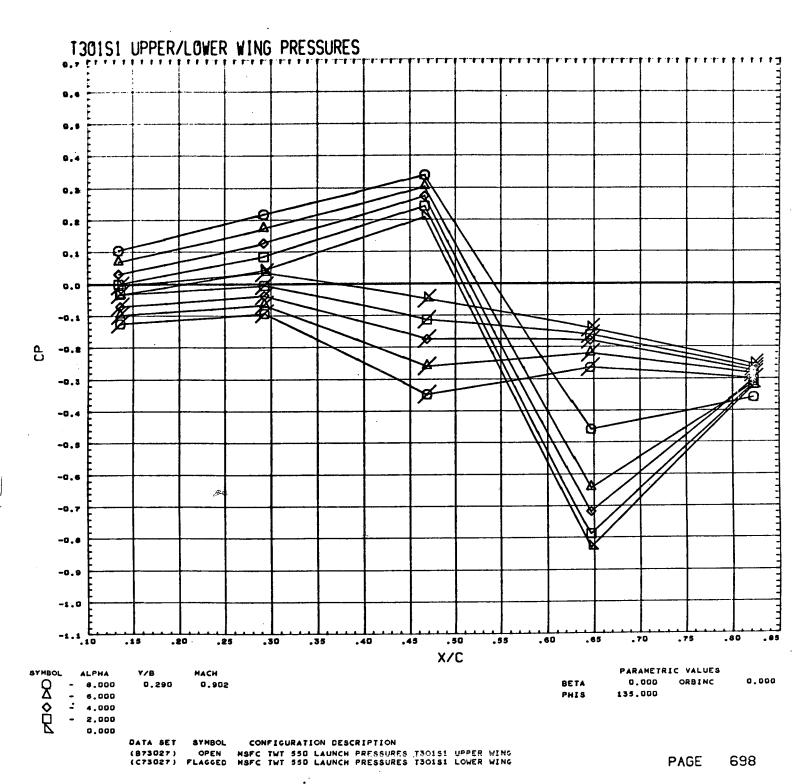


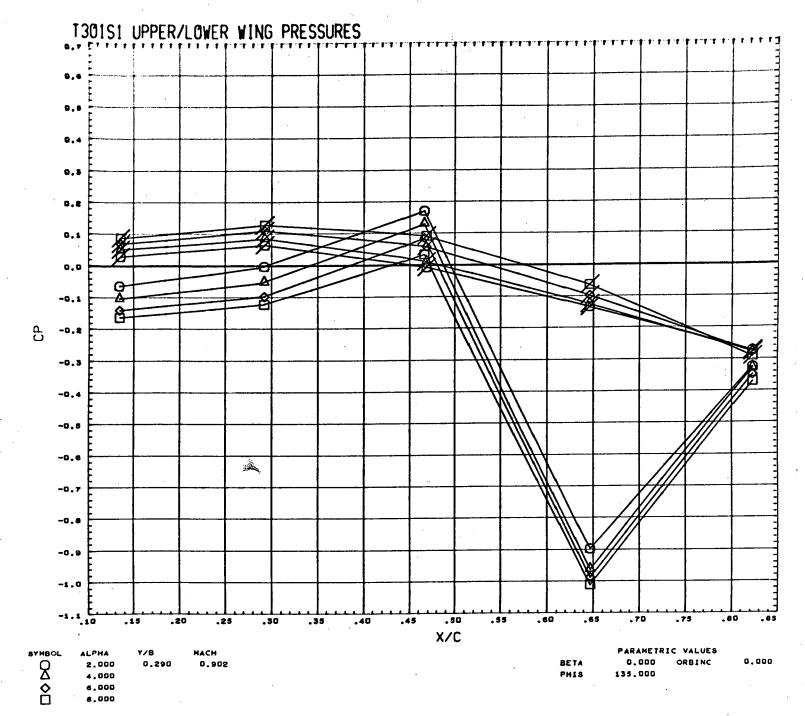


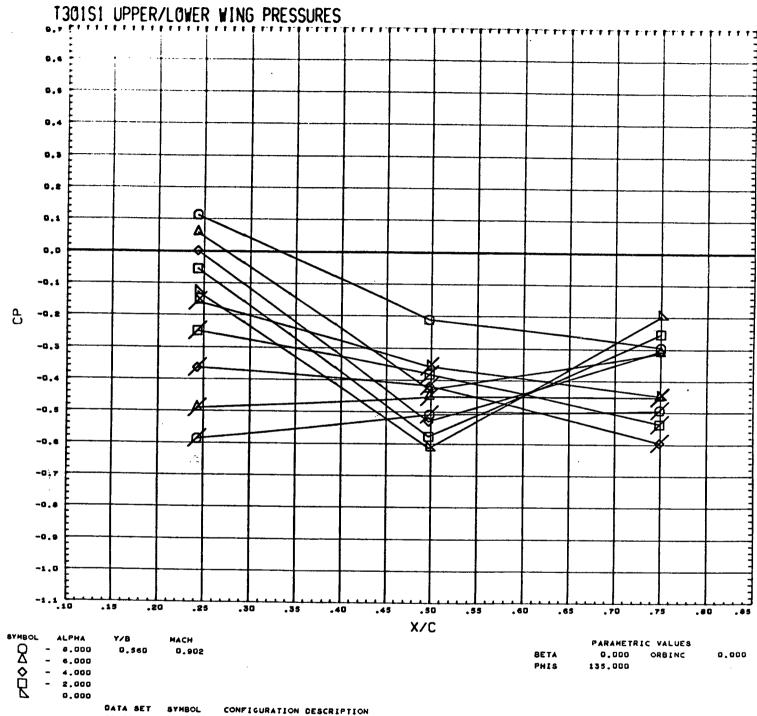


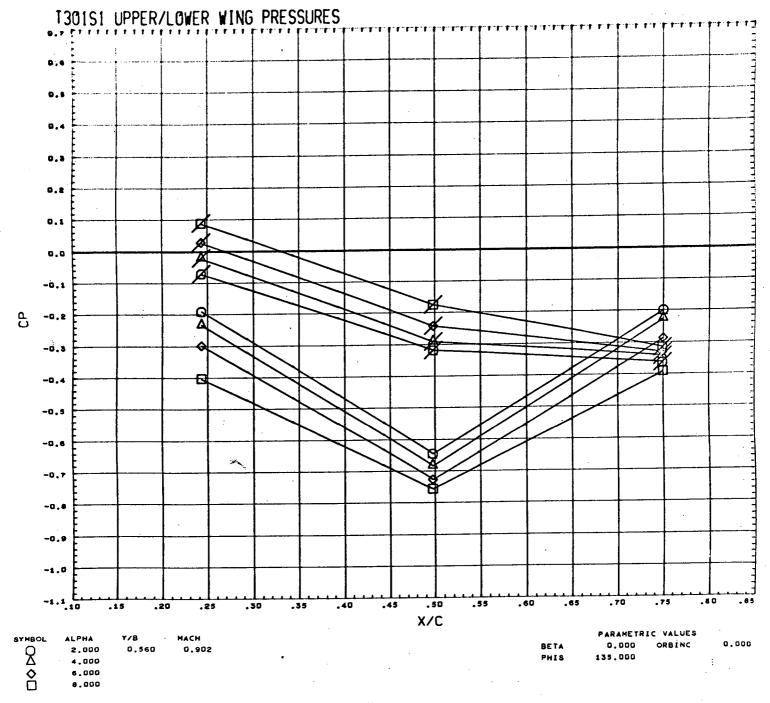


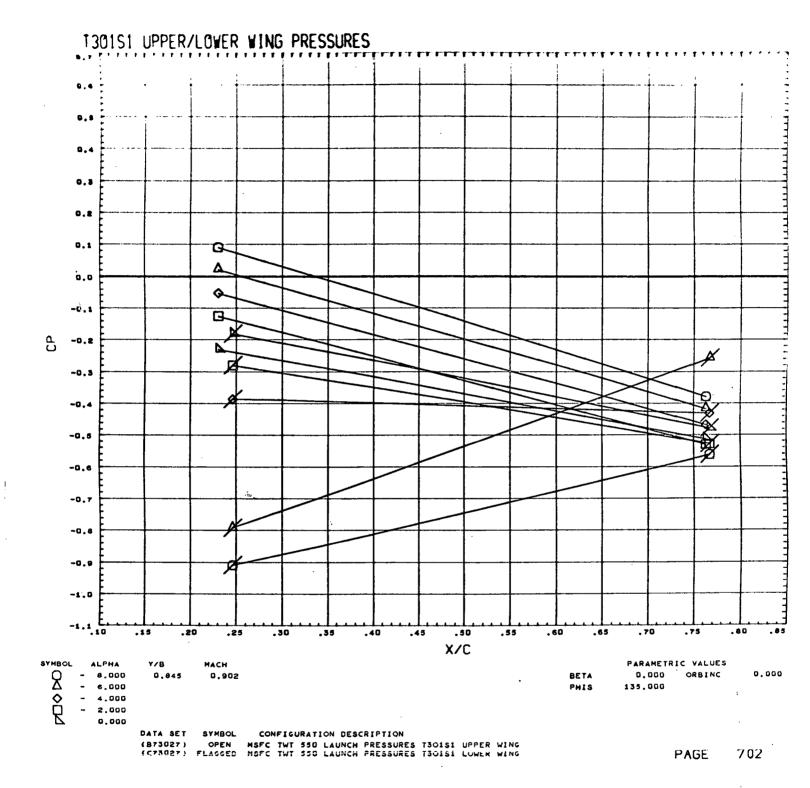


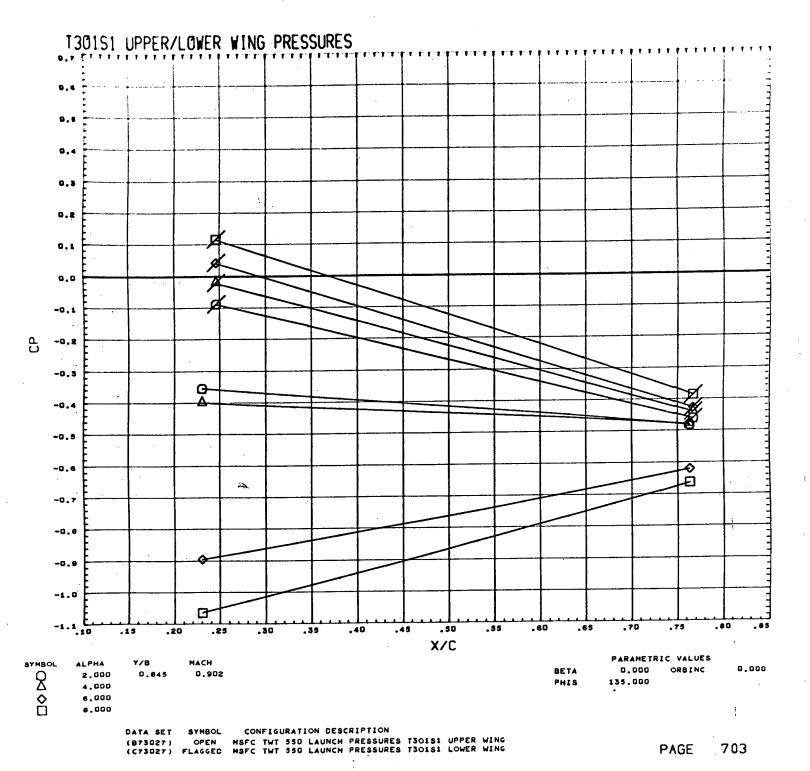


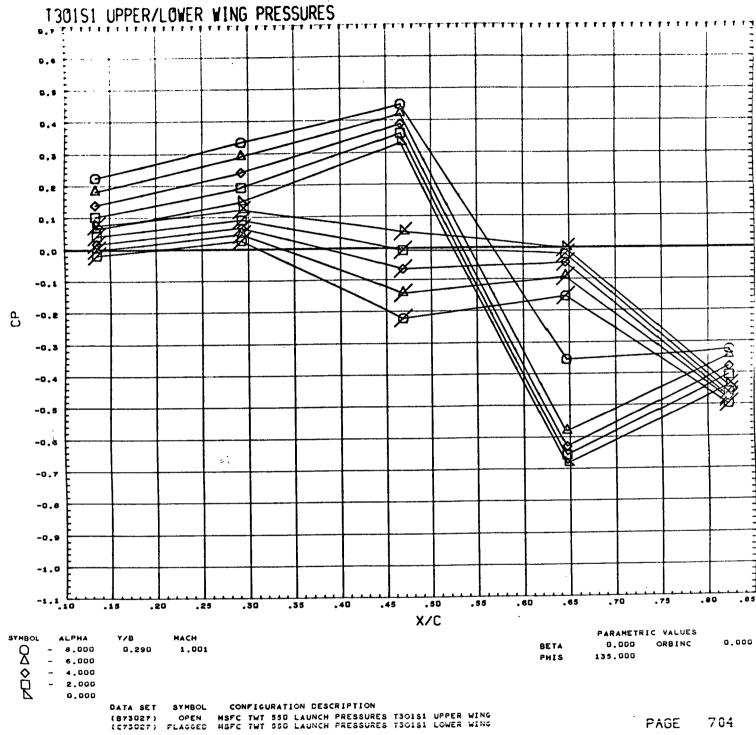


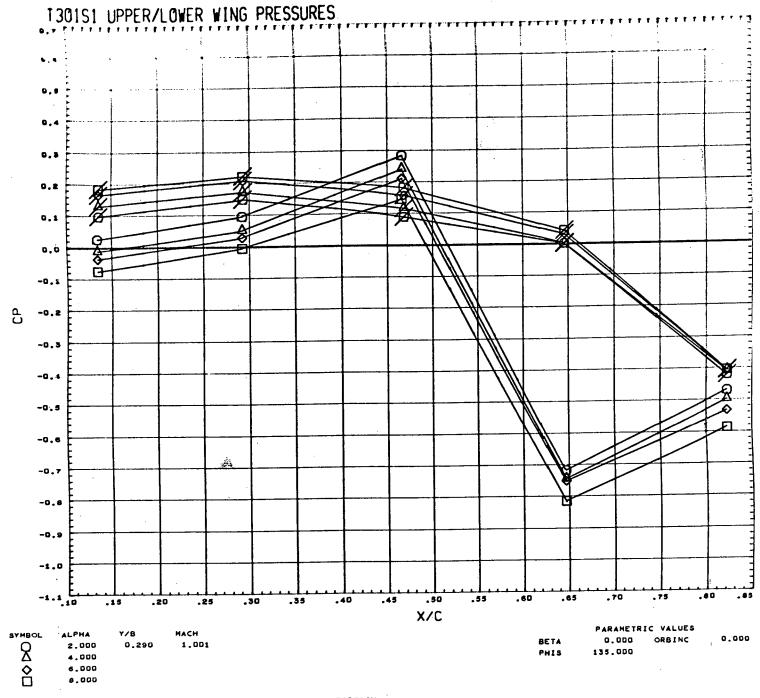






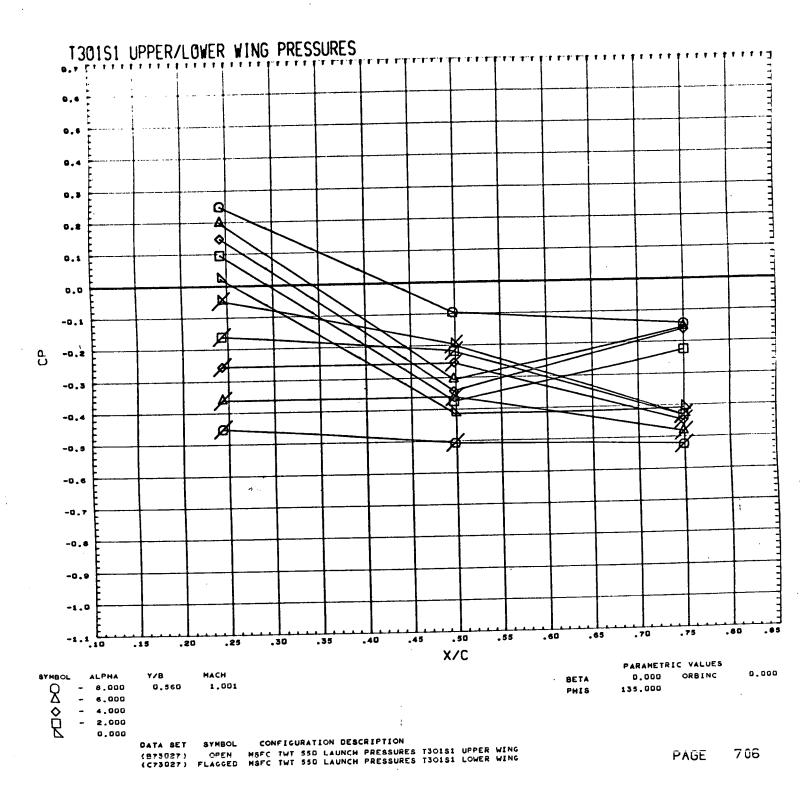


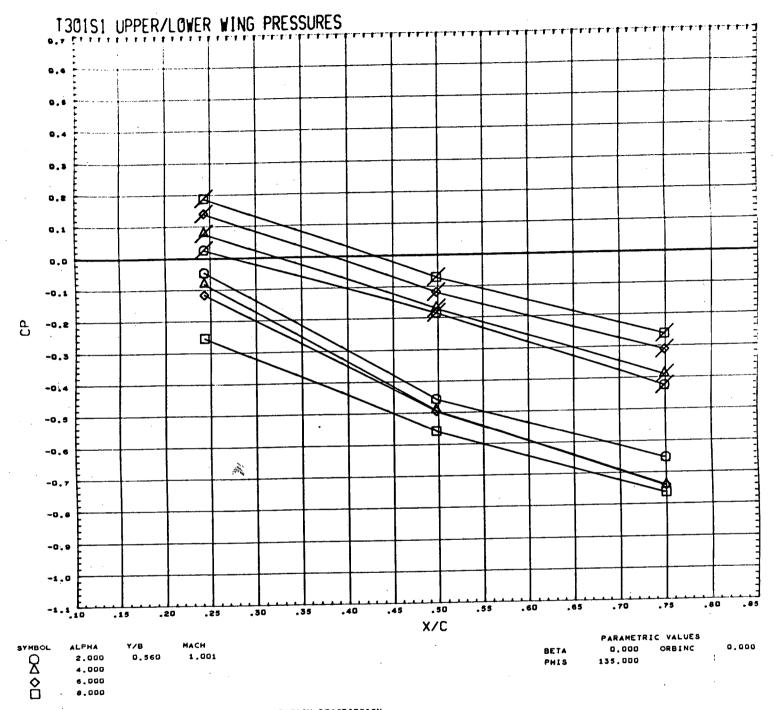


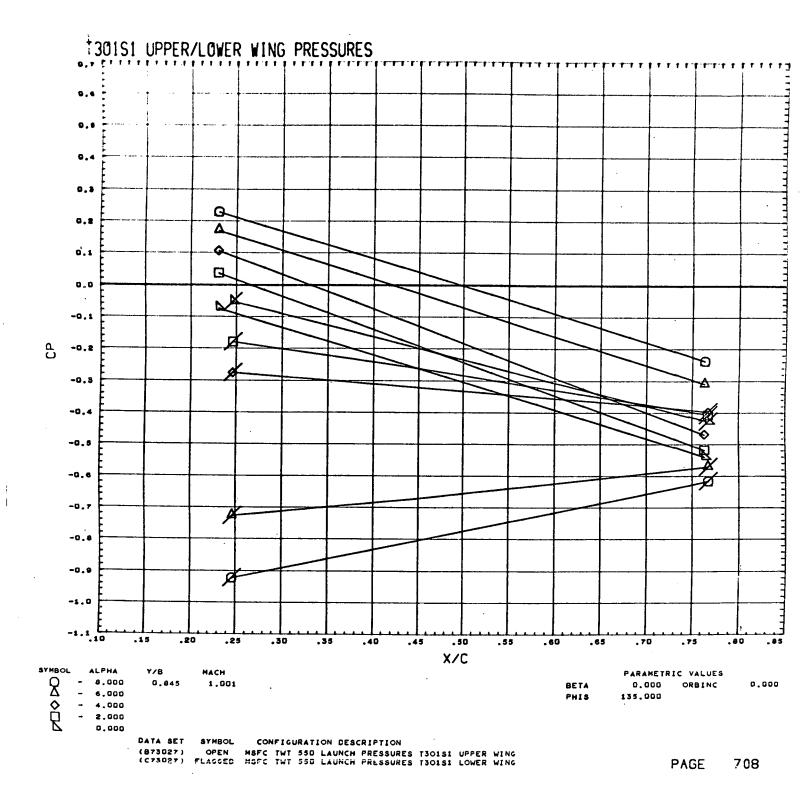


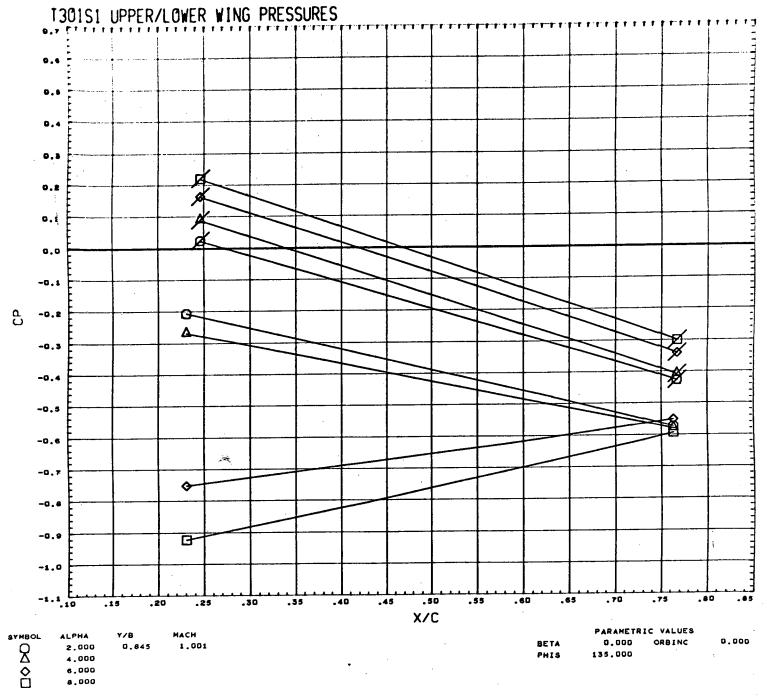
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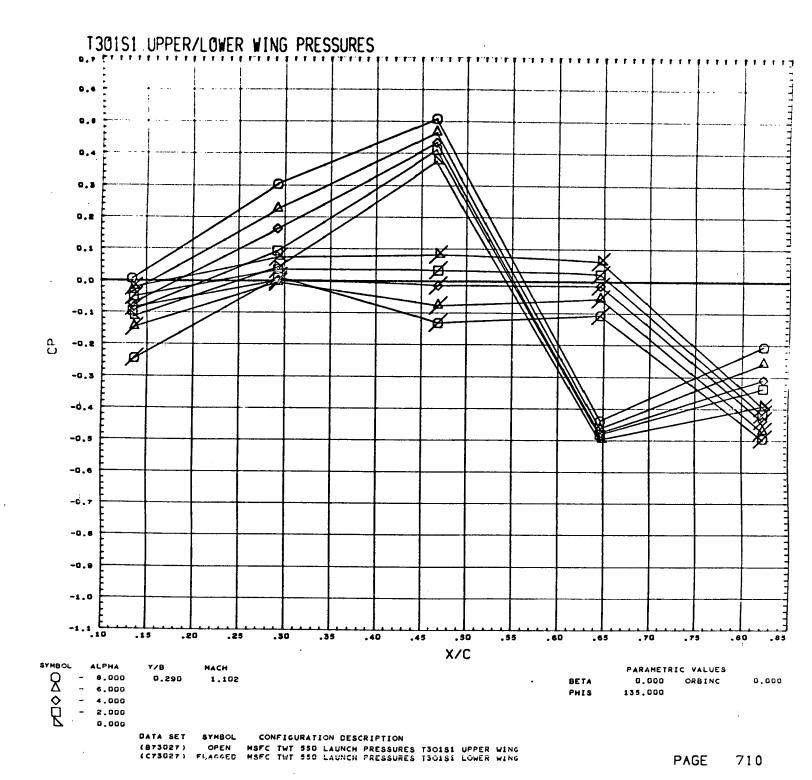
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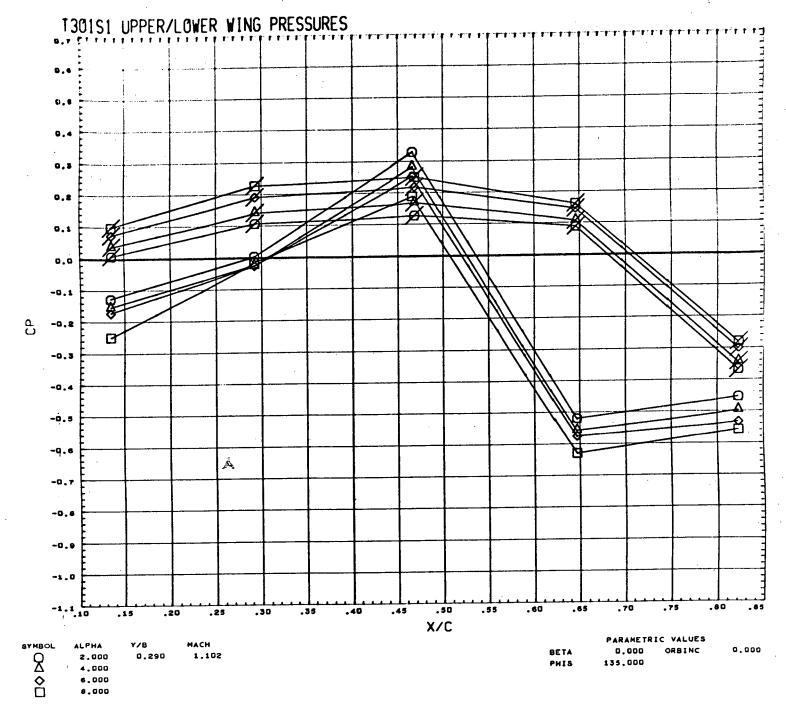


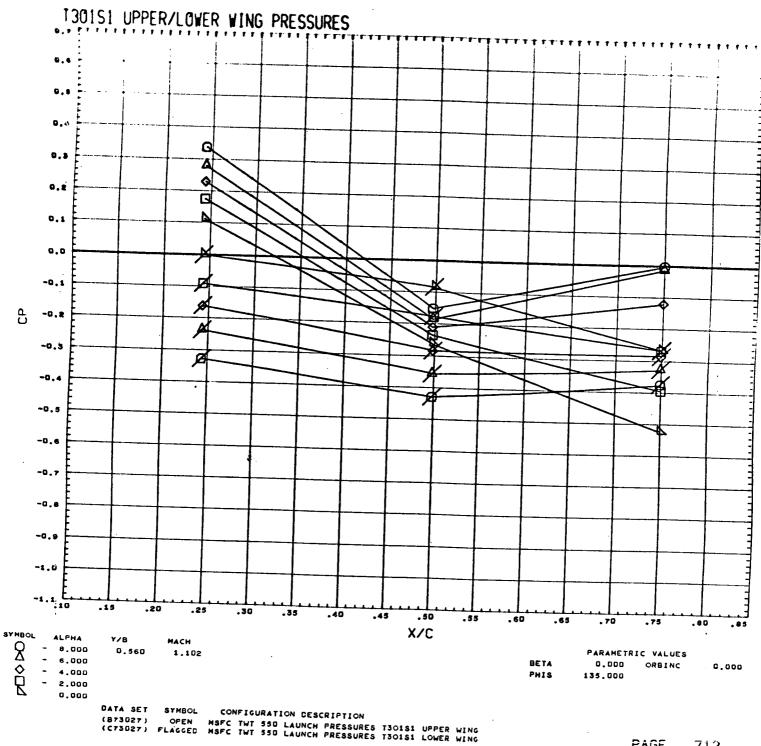


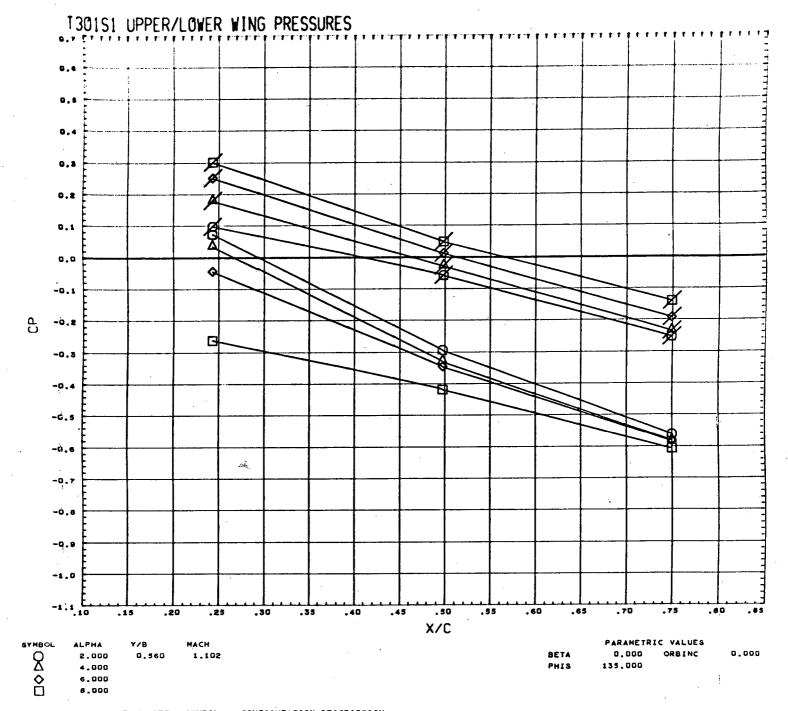




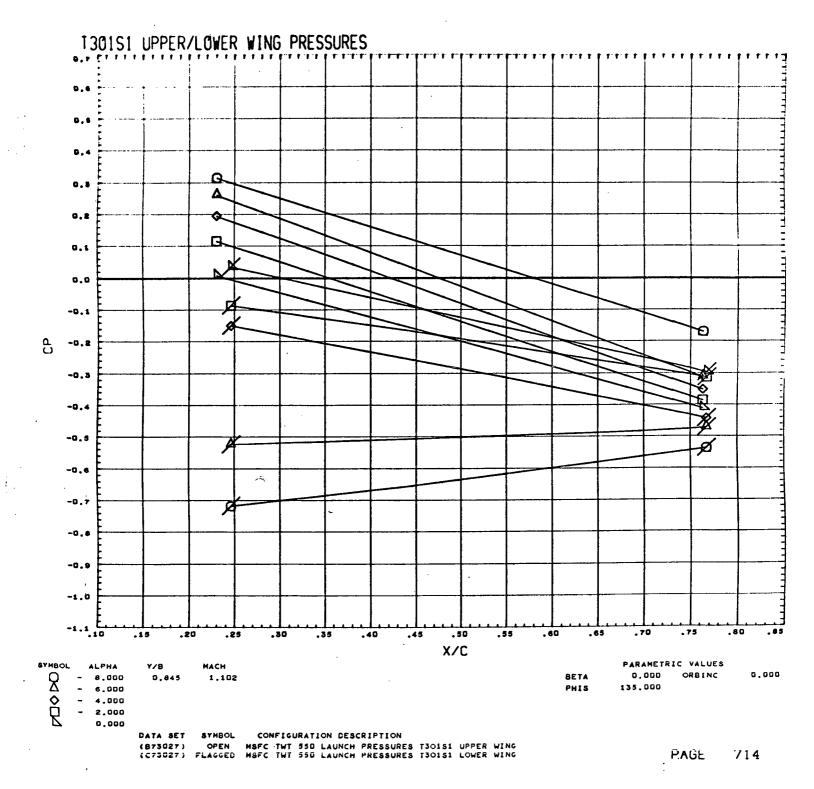


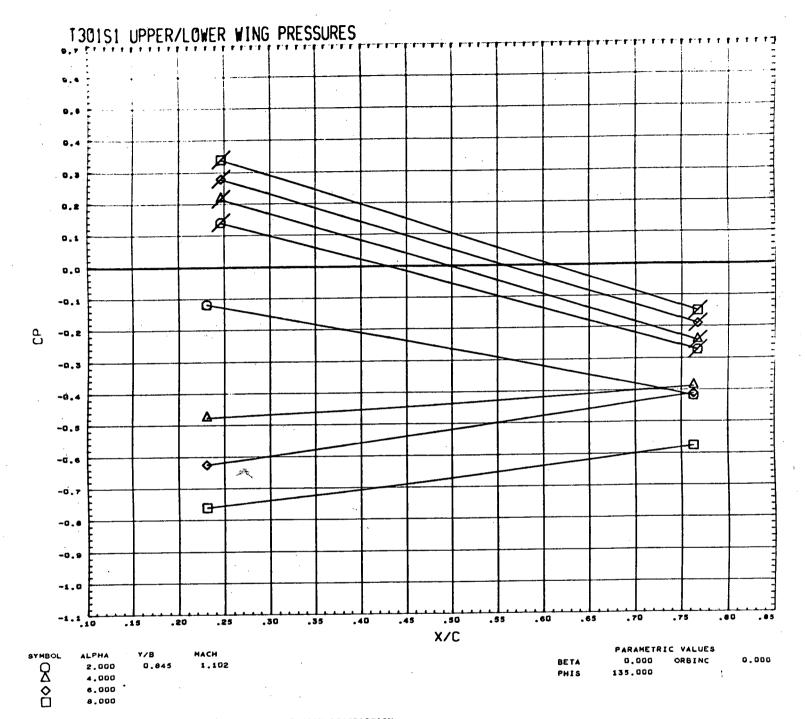


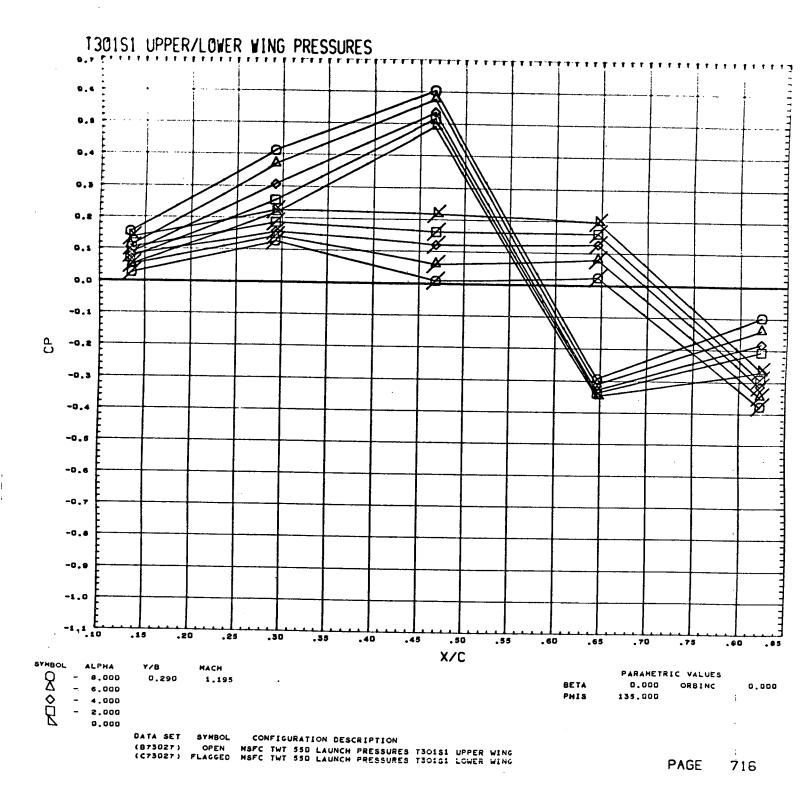


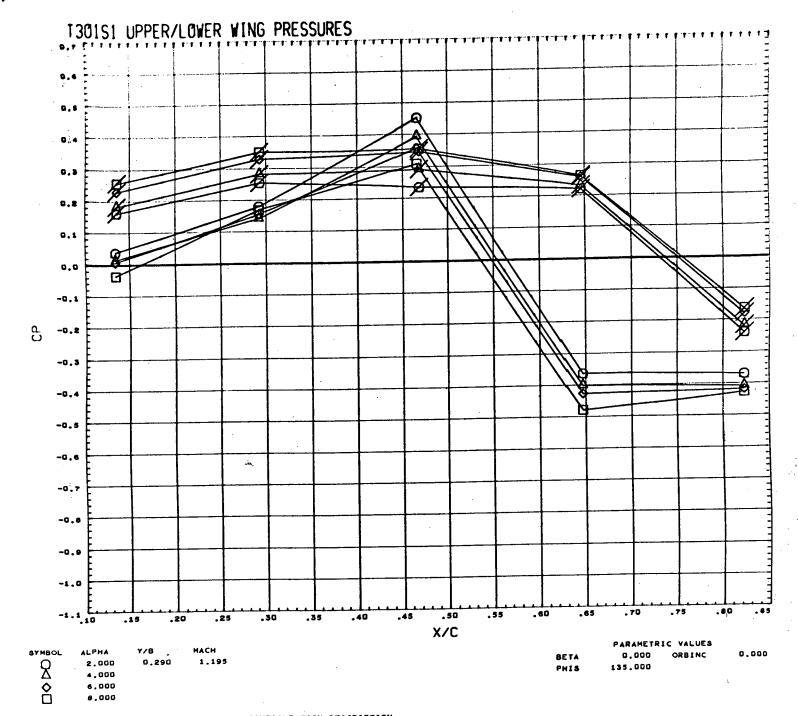


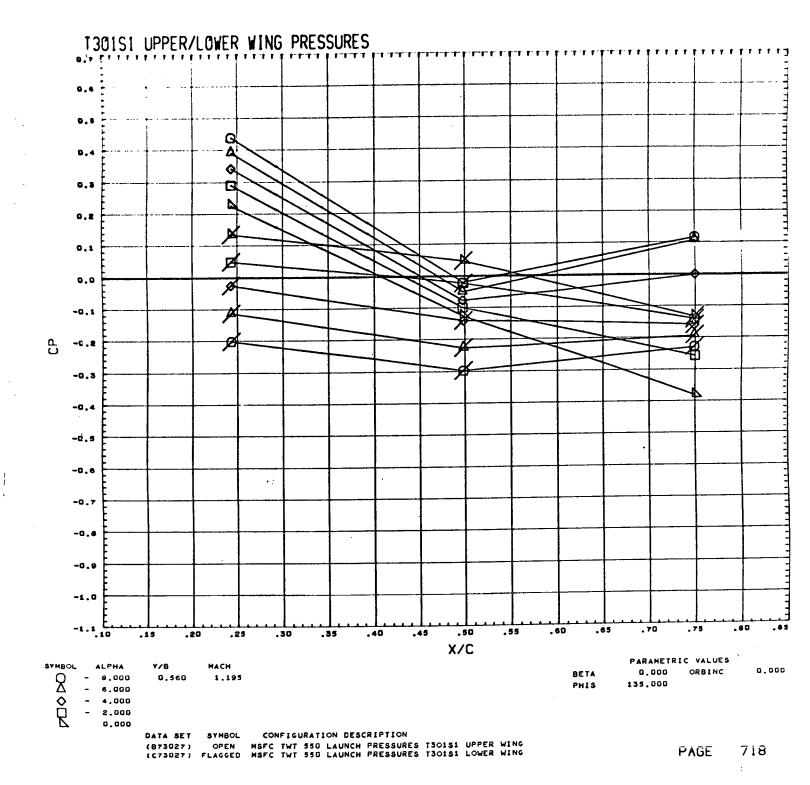
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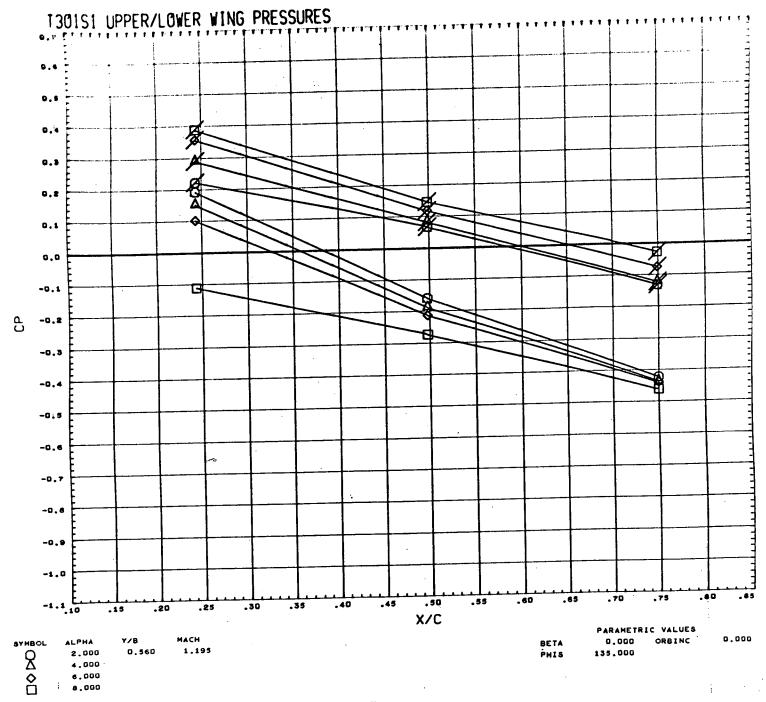




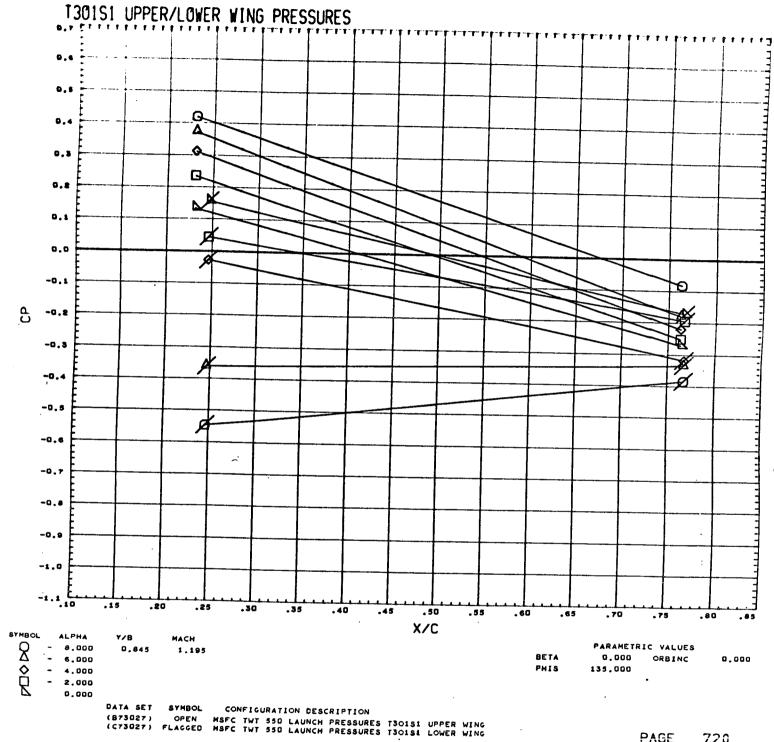




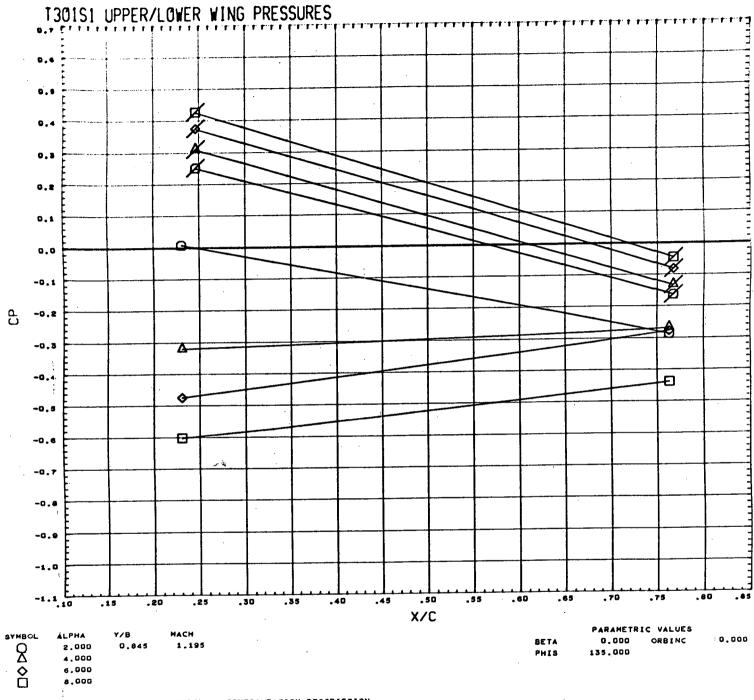


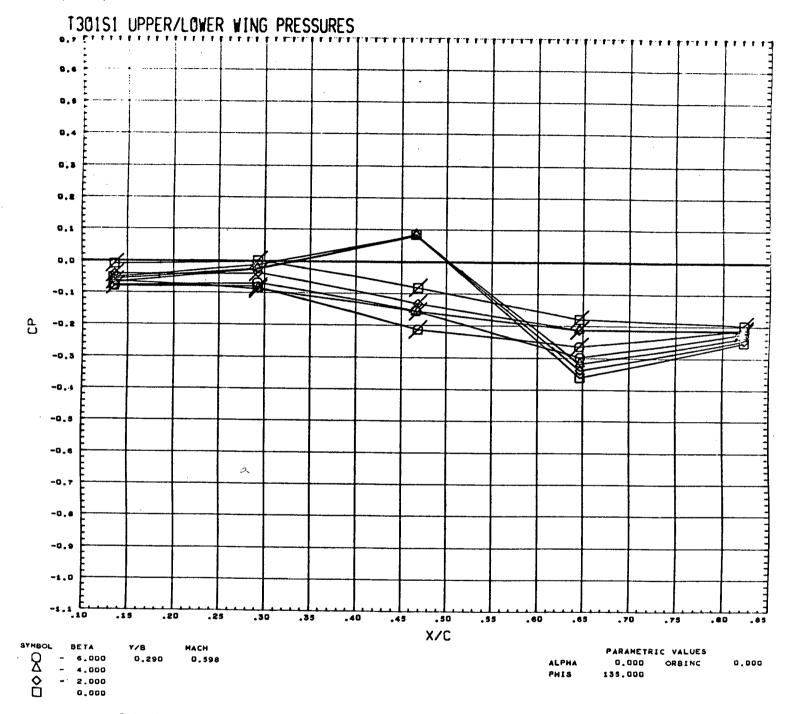


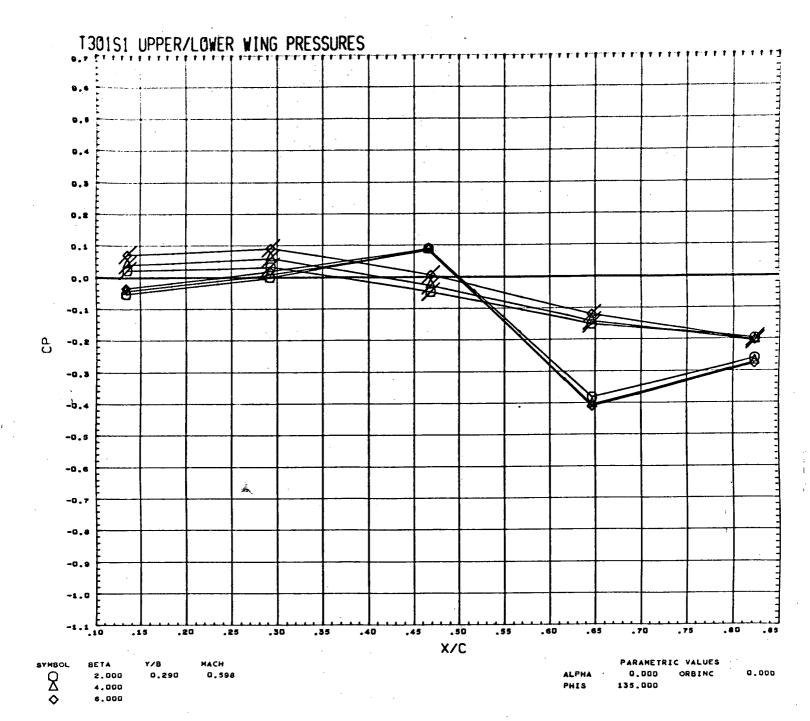
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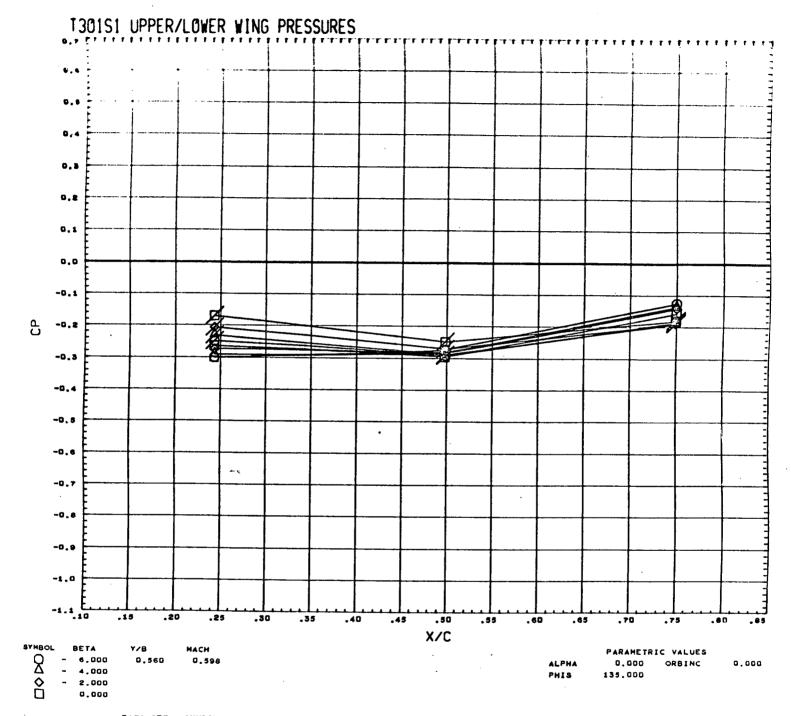


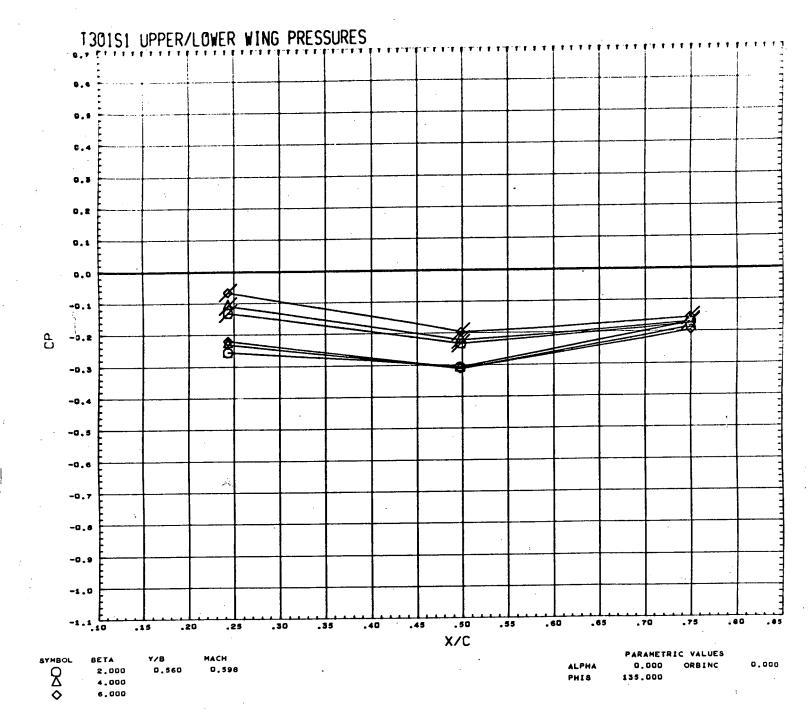
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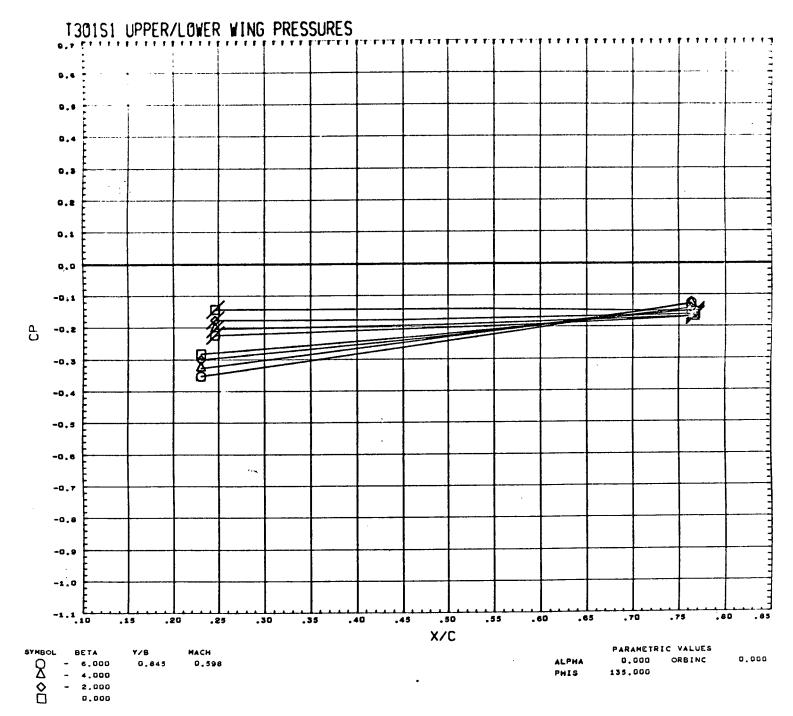


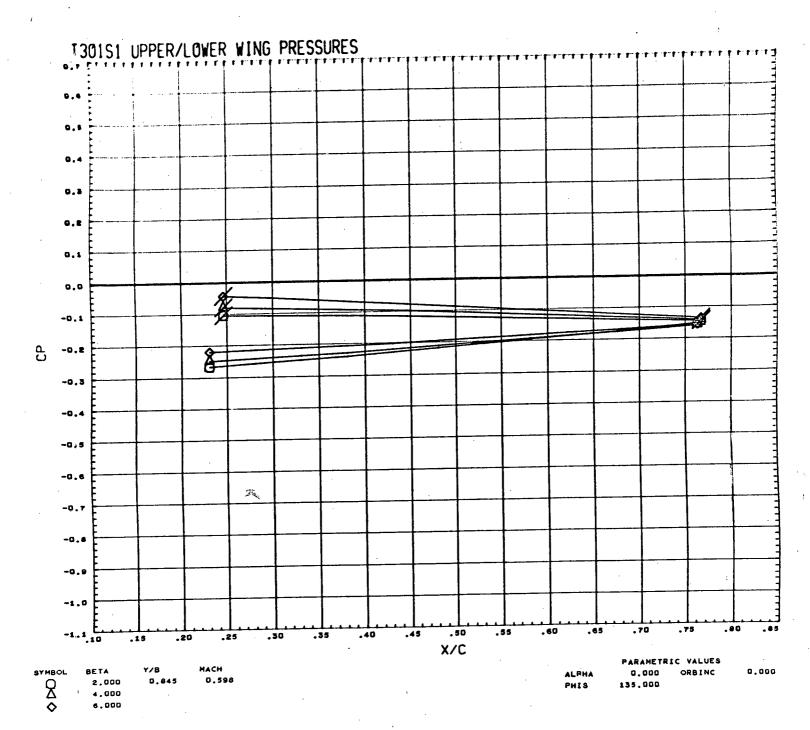


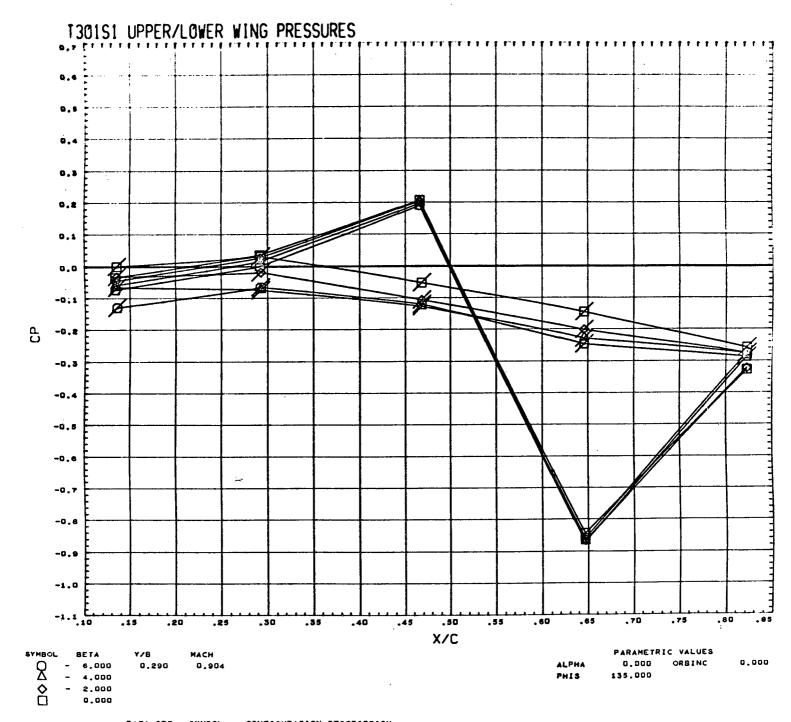


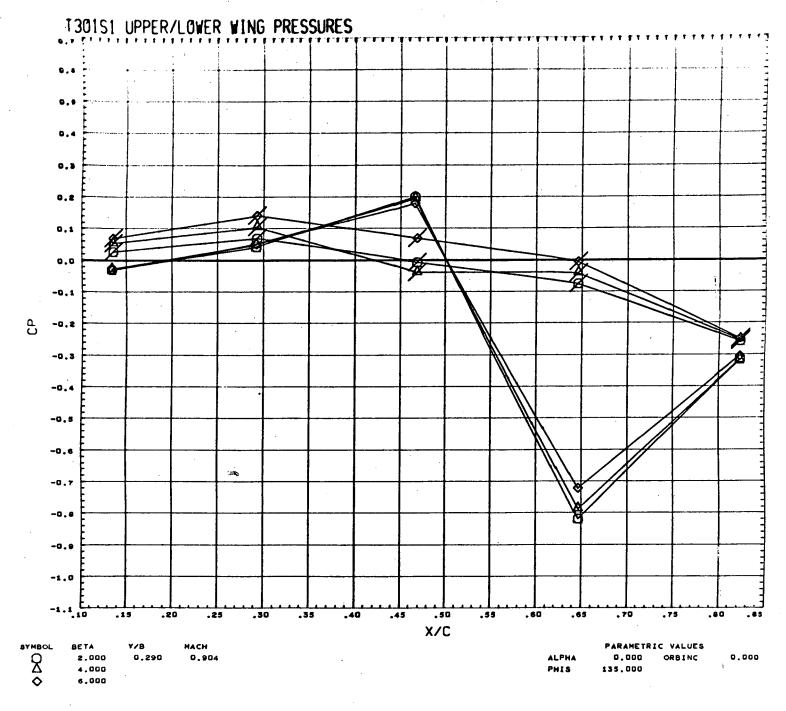


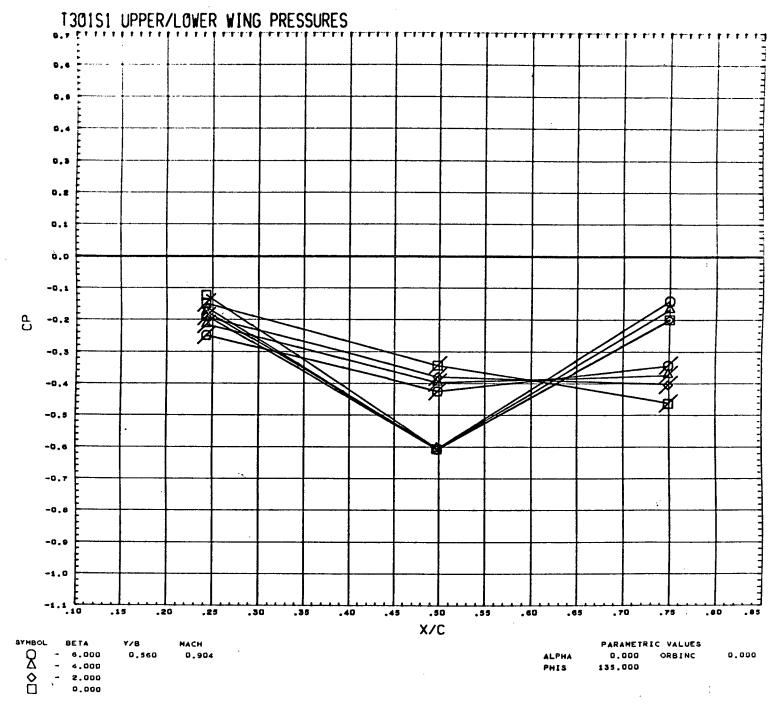


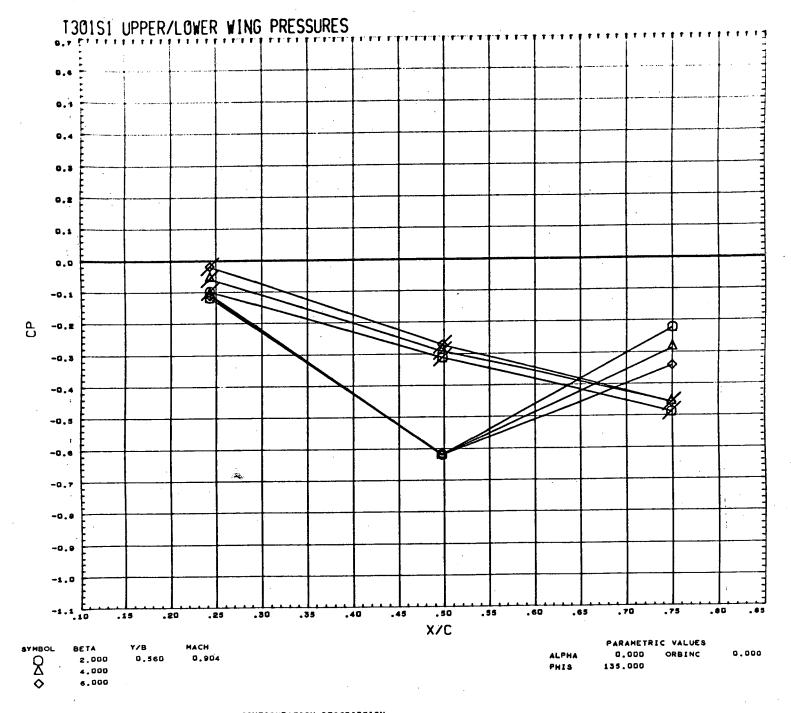




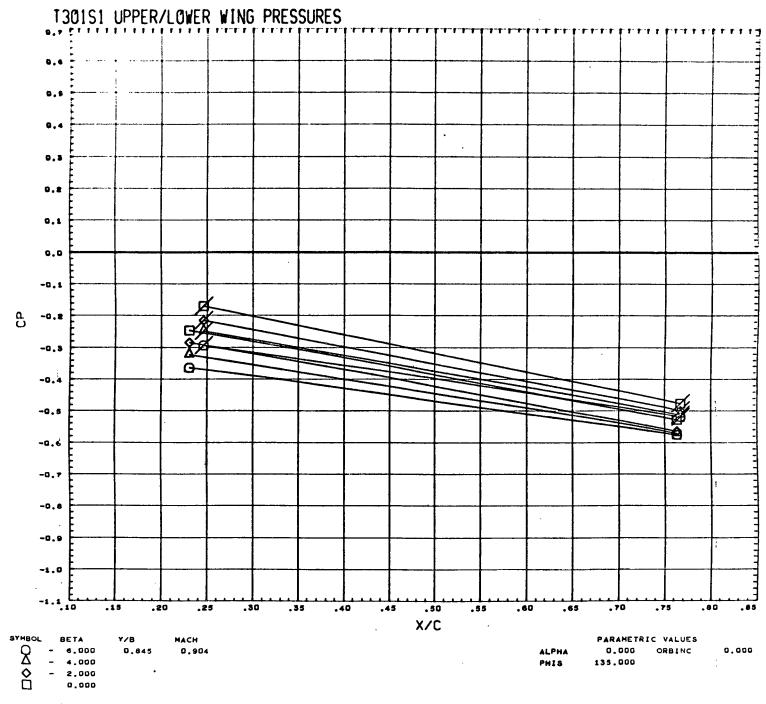


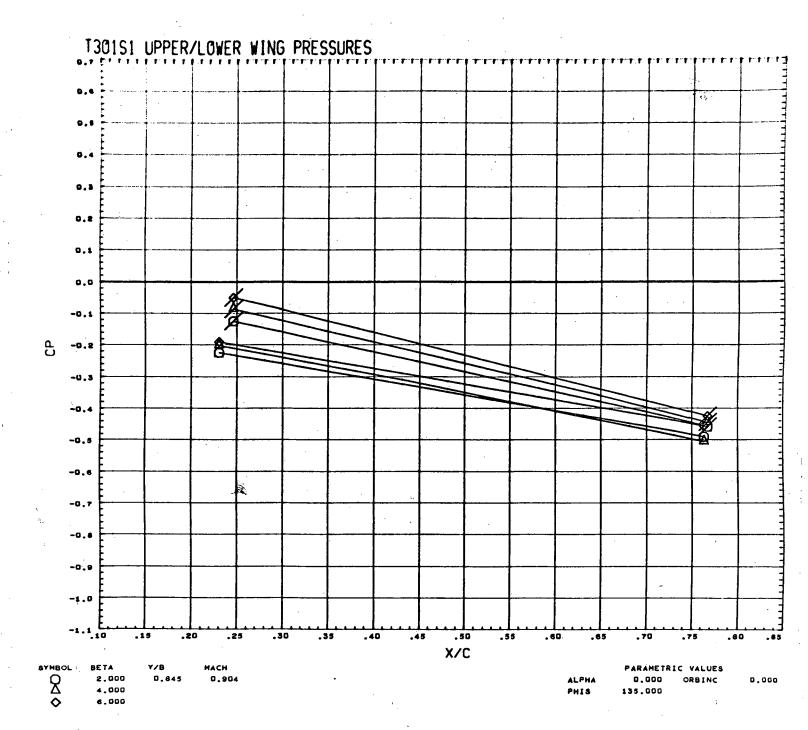


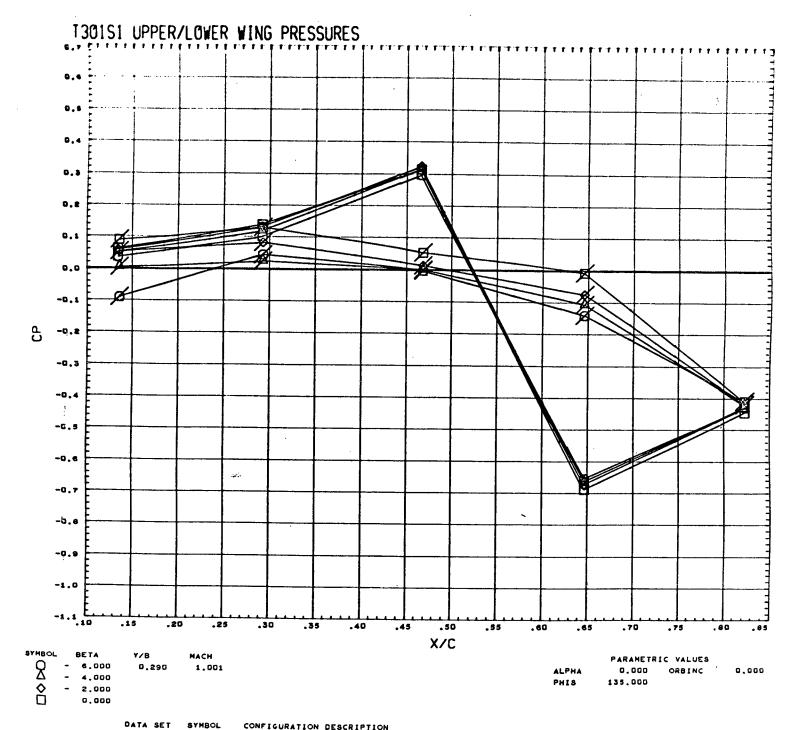


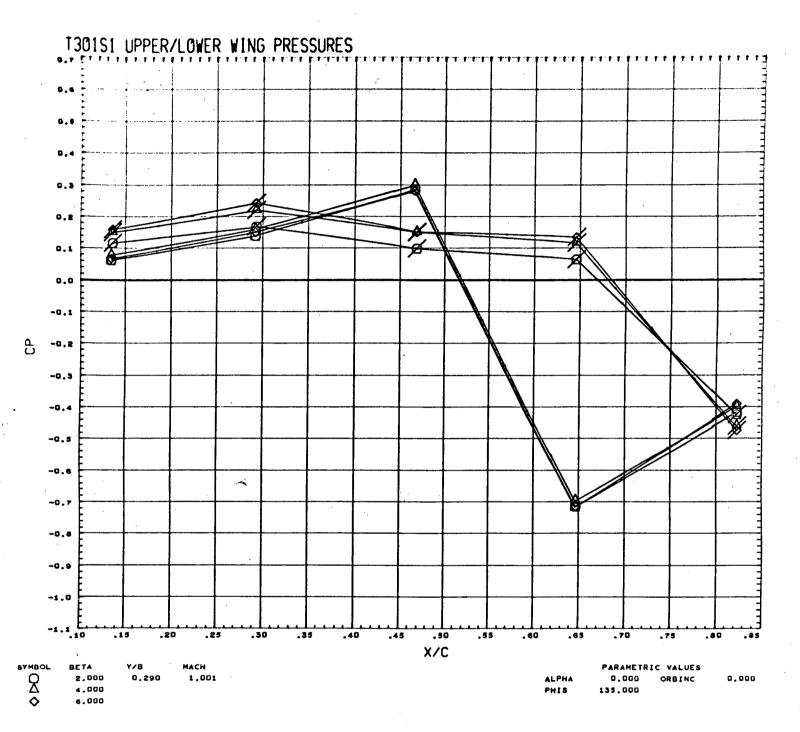


PAGE _ .731

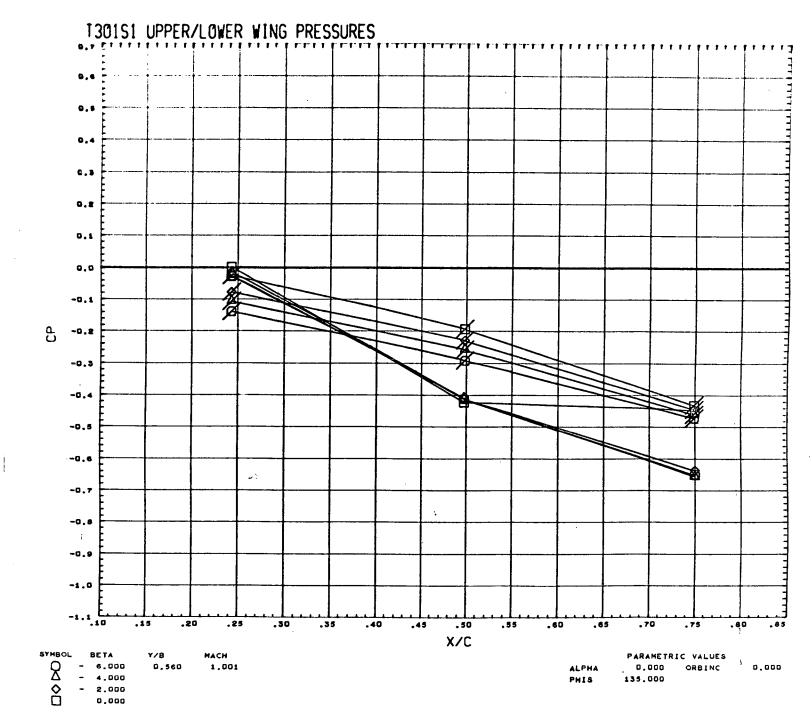


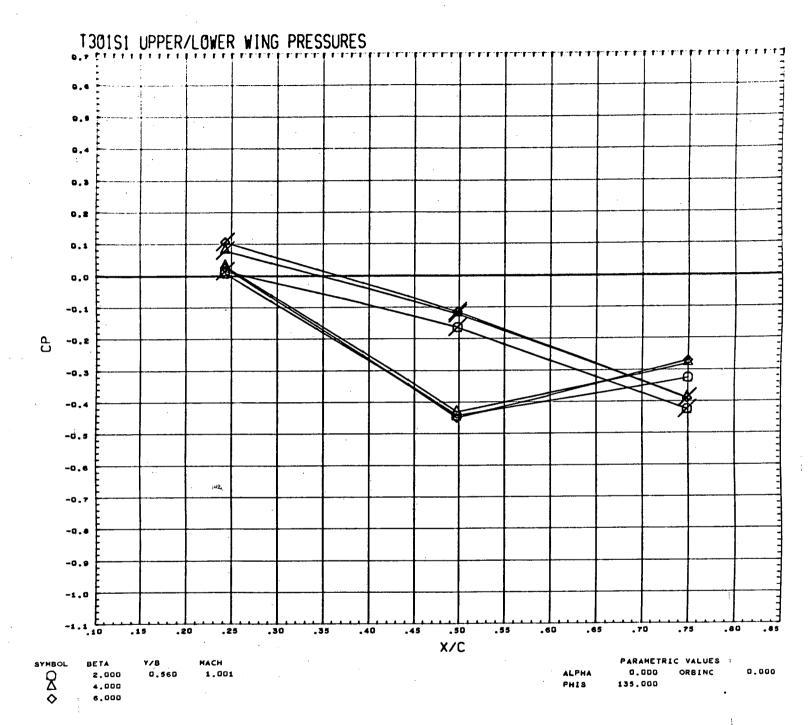








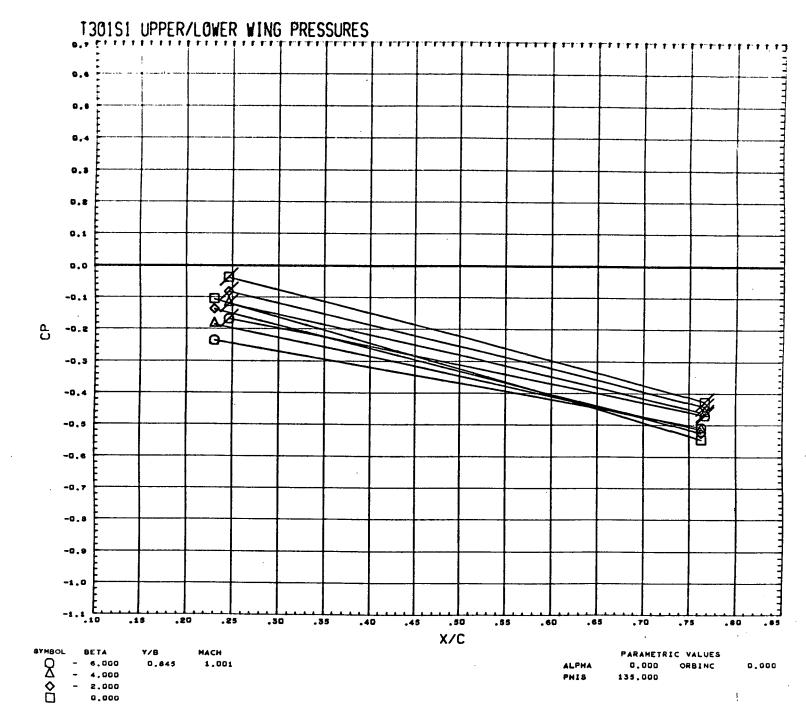


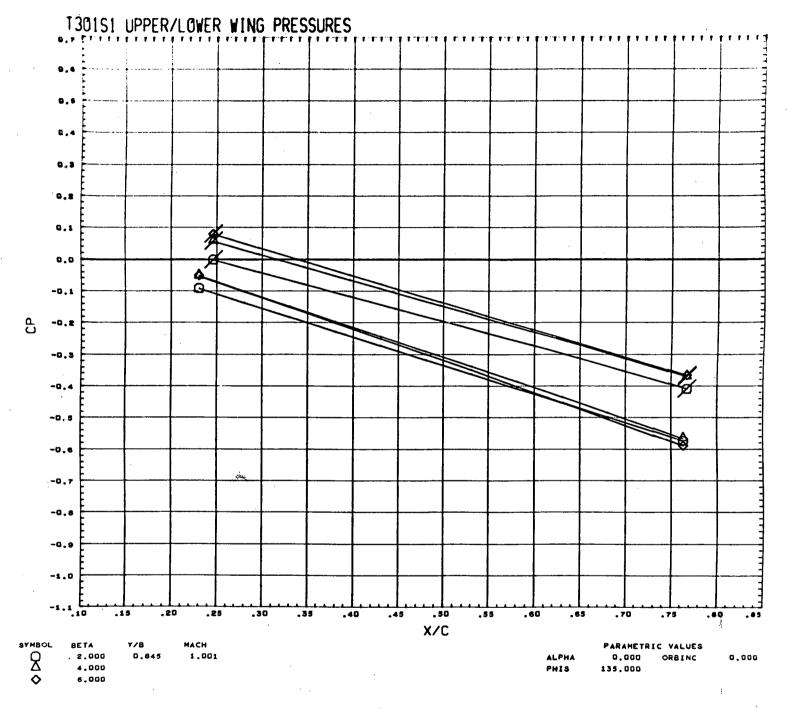


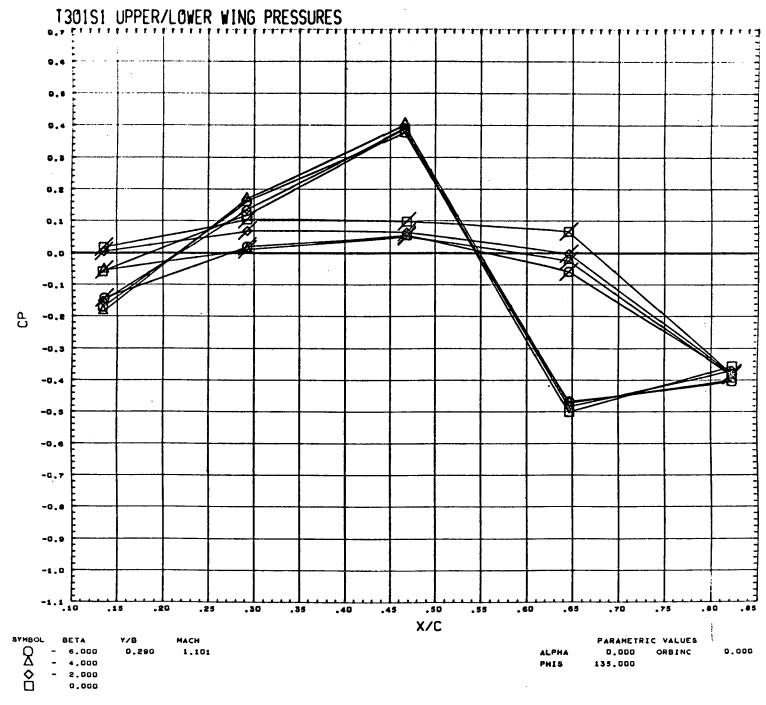
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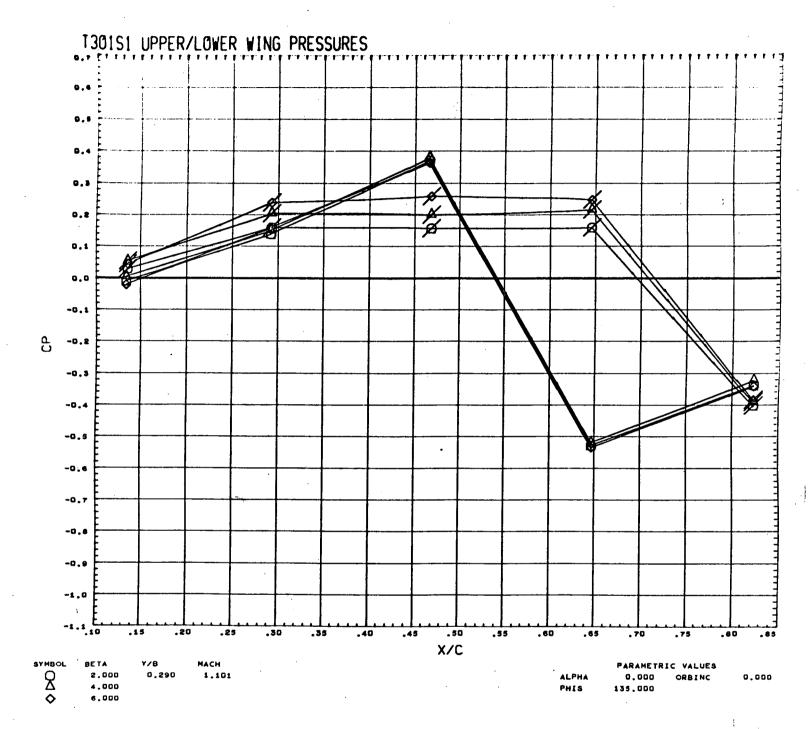
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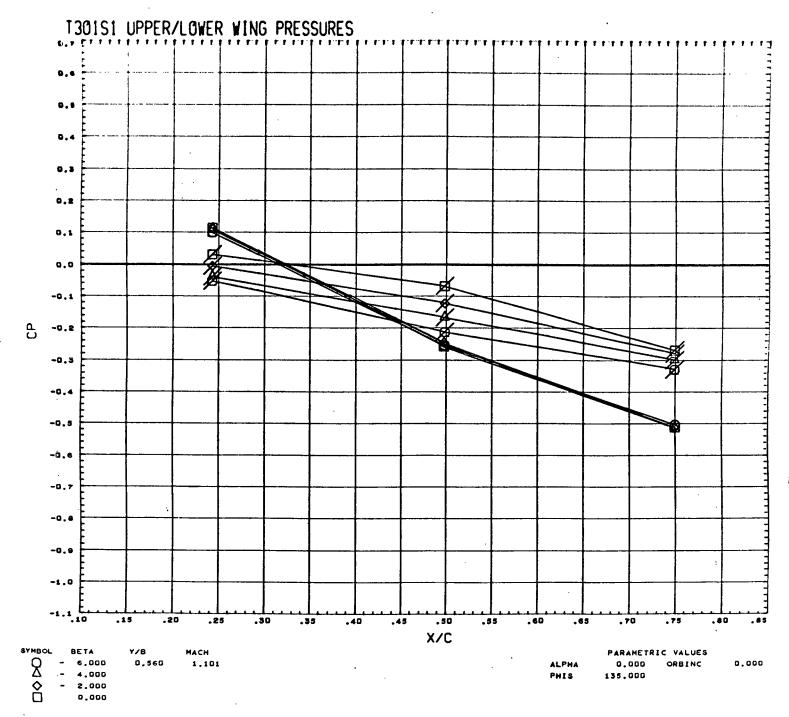
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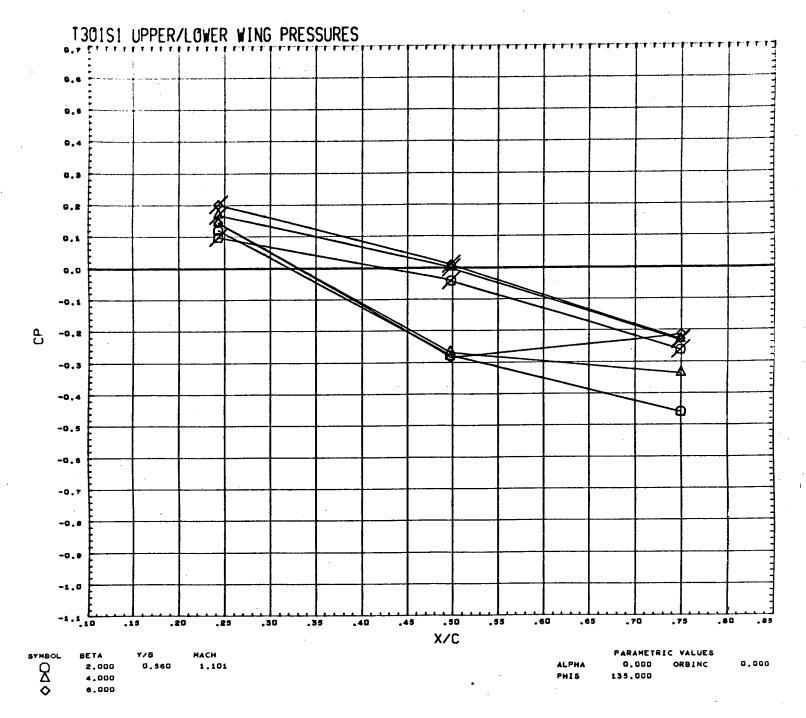


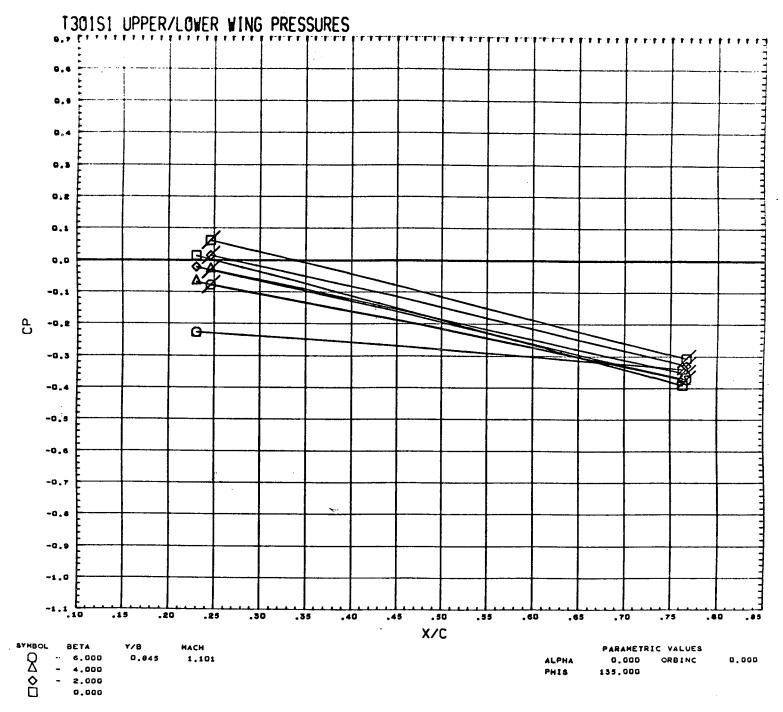


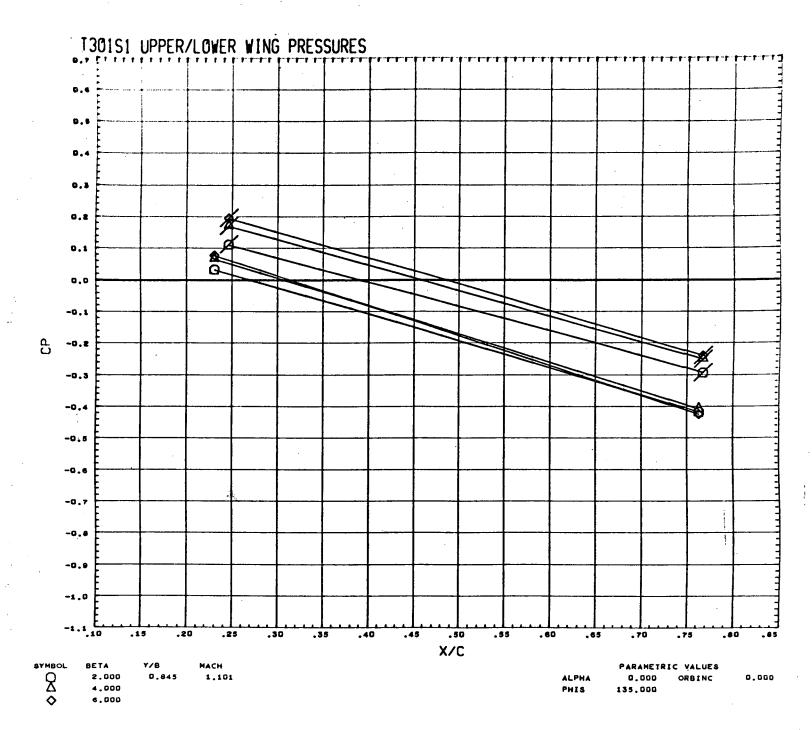






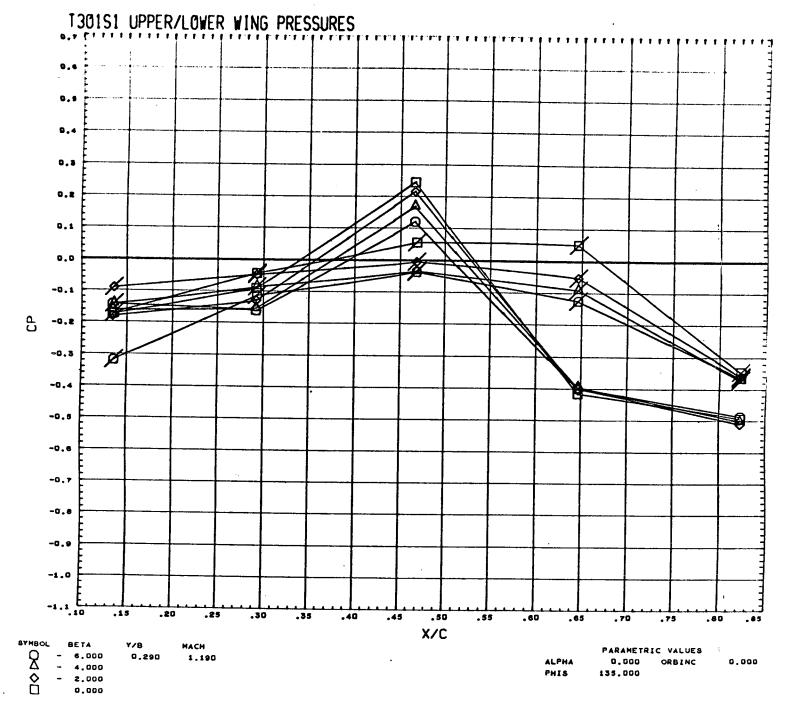


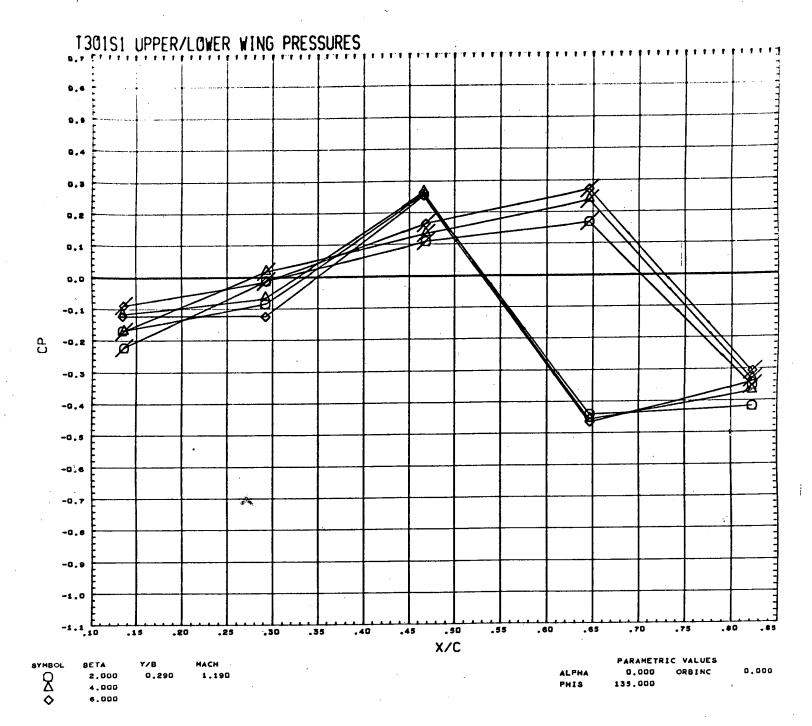


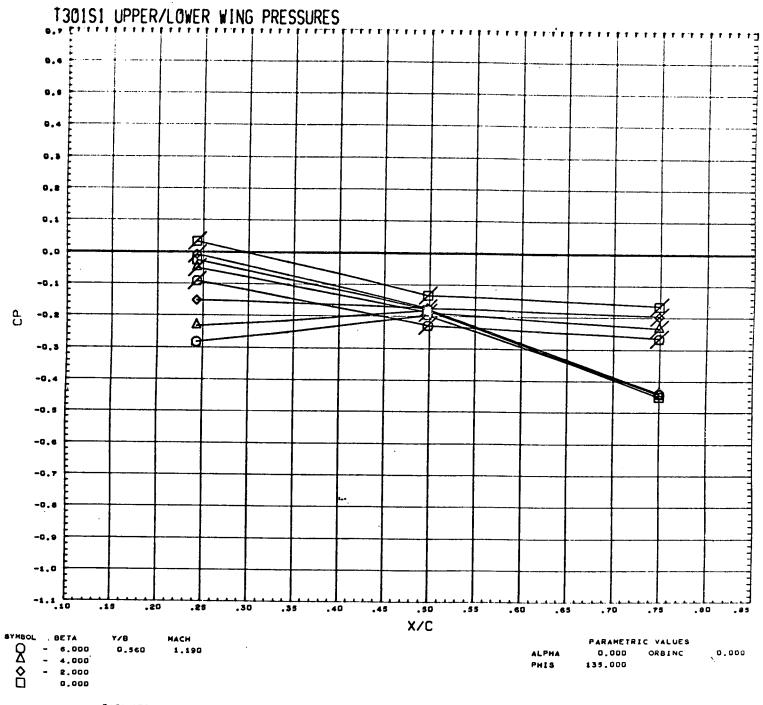


PAGE 745

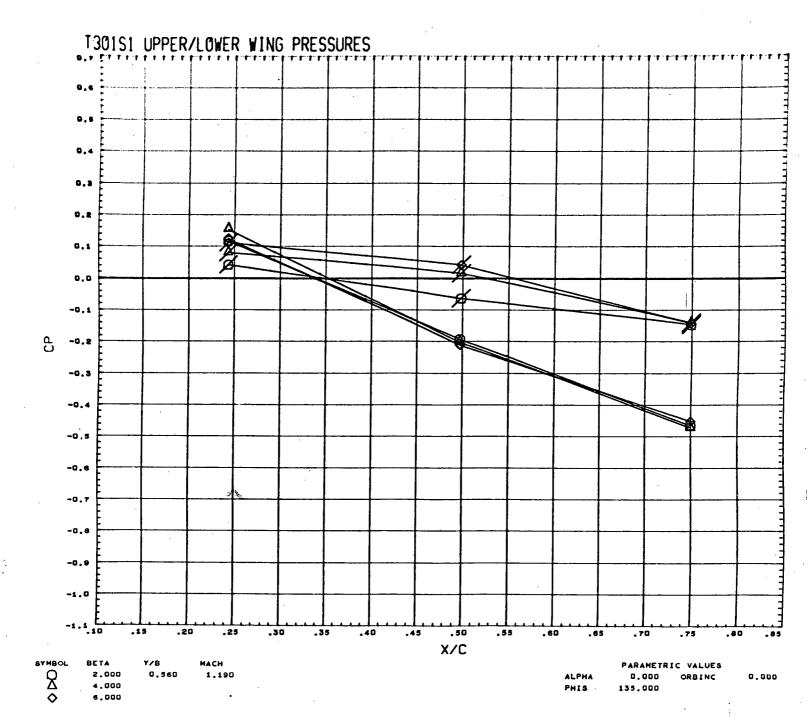
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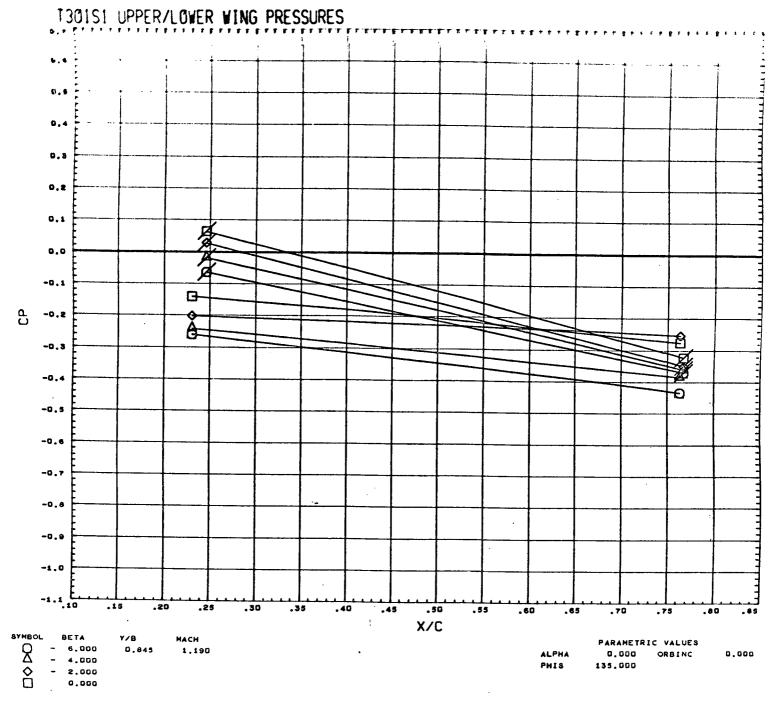


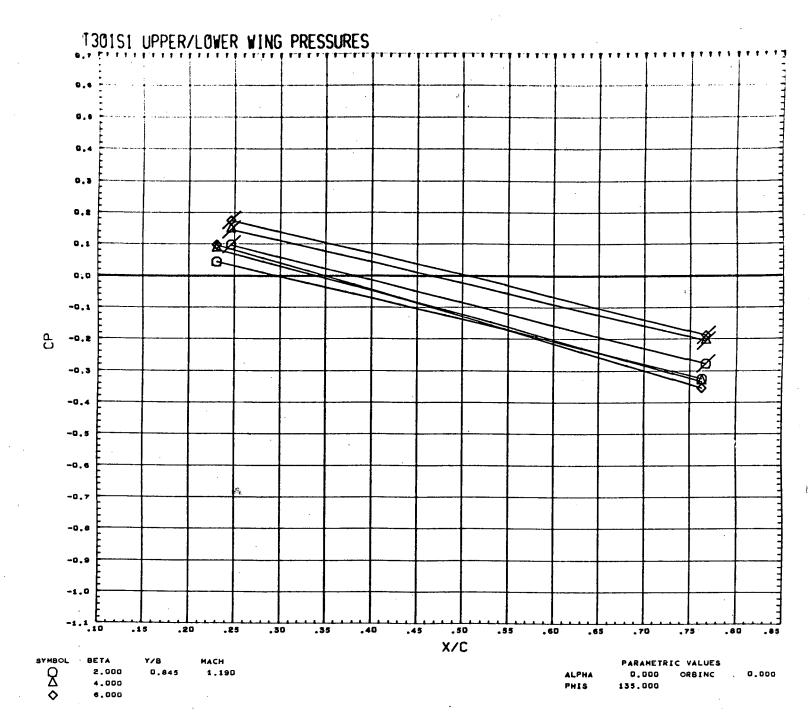


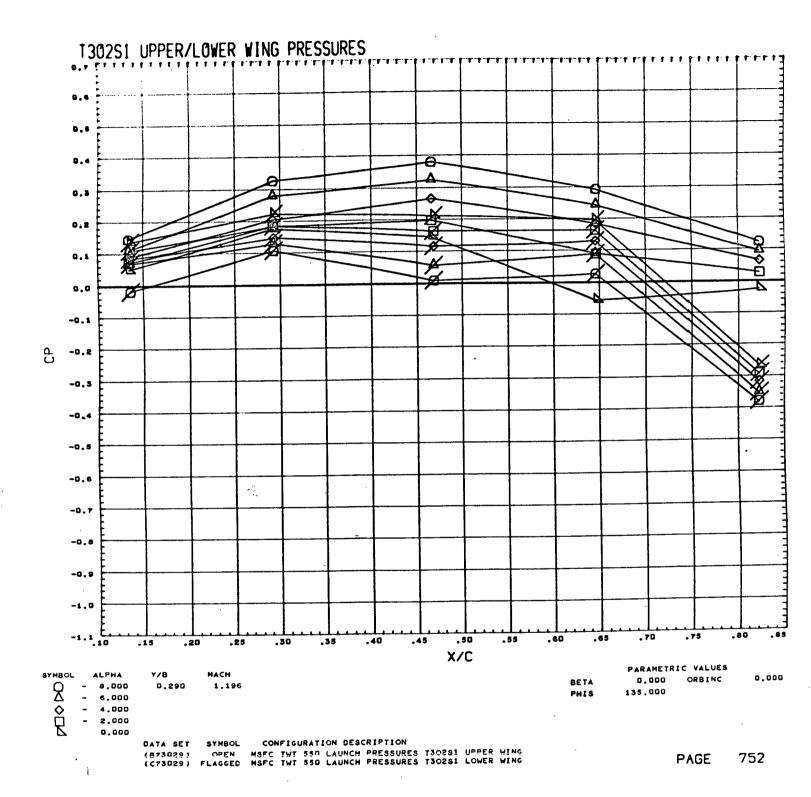


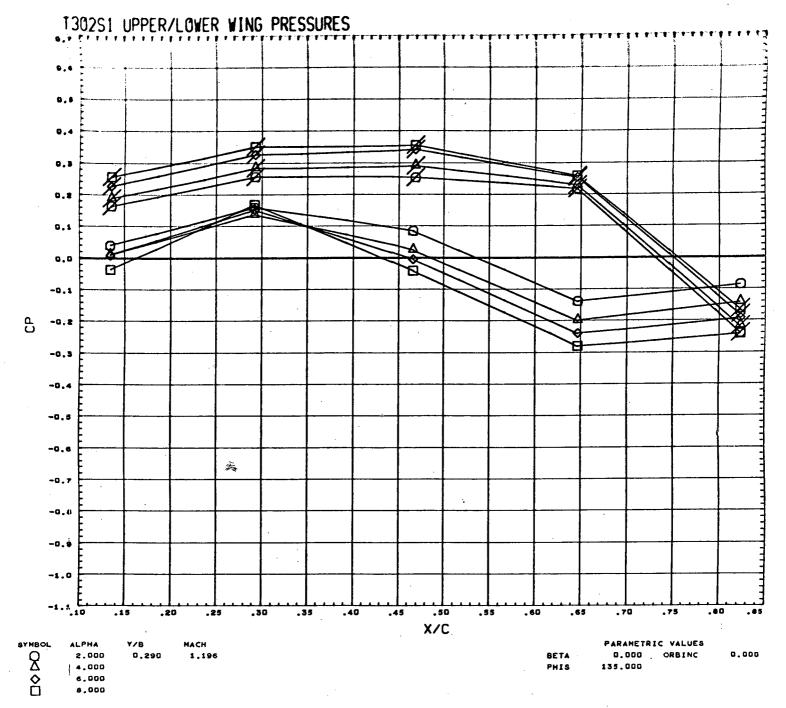
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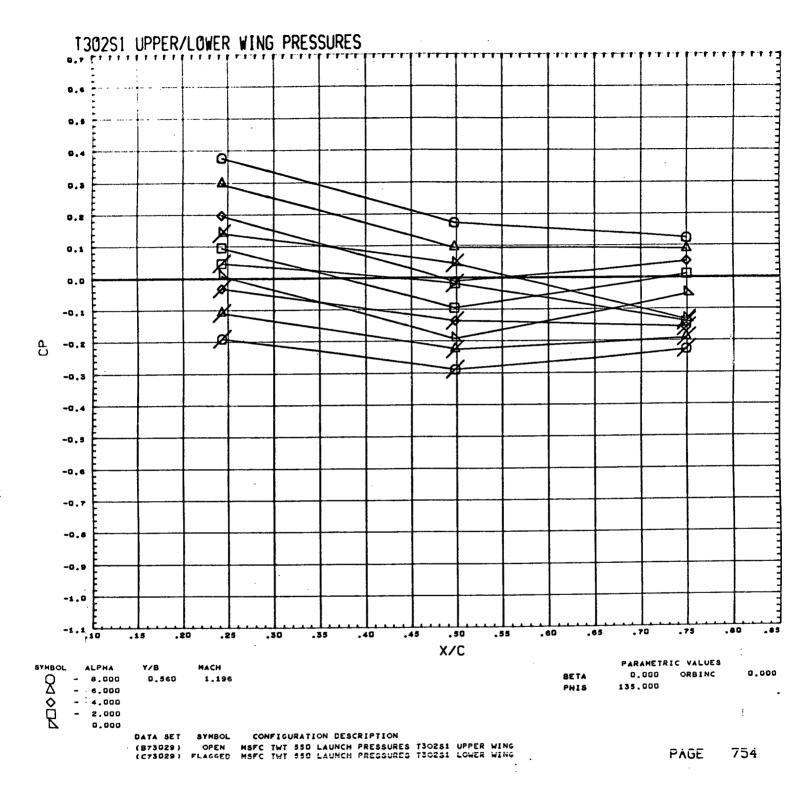


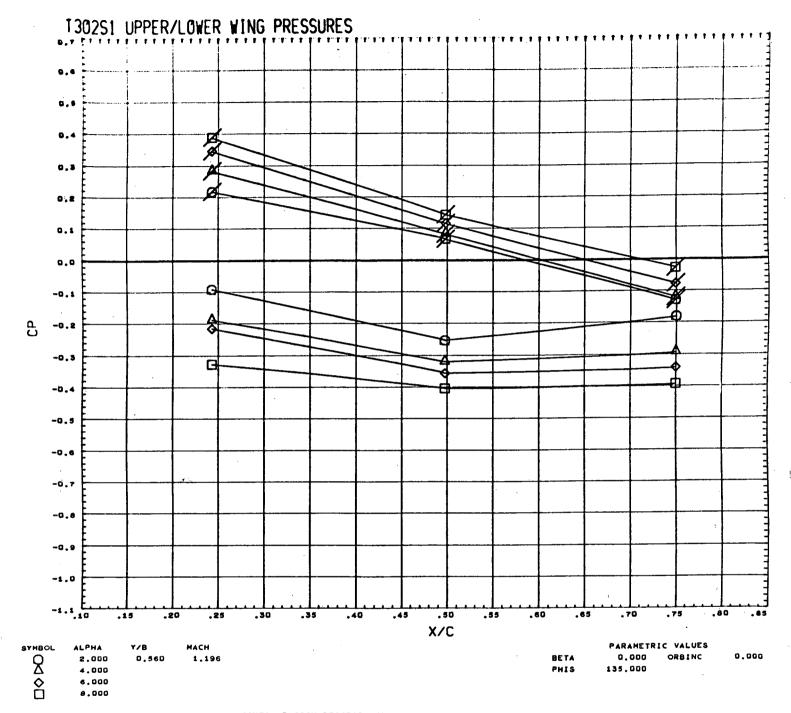






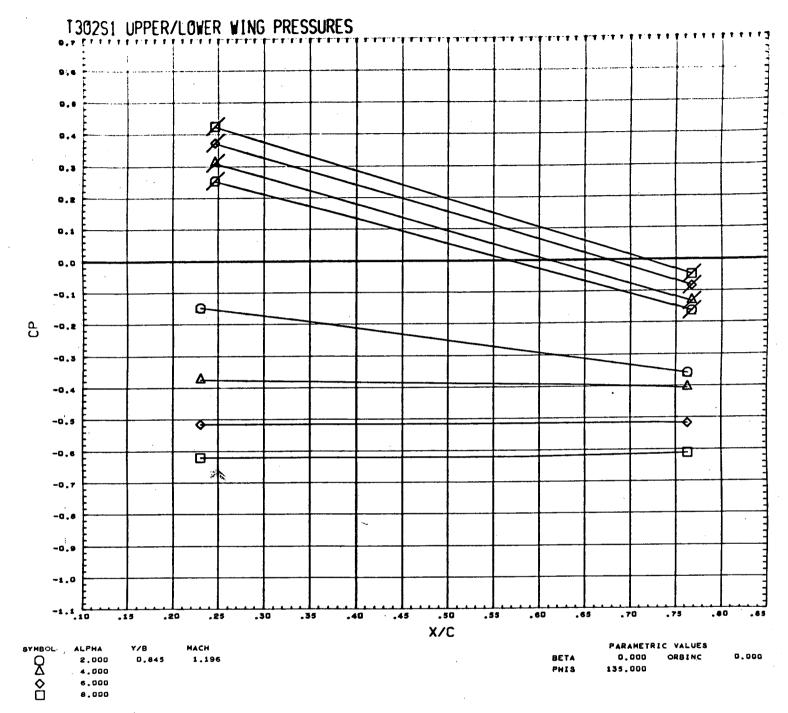


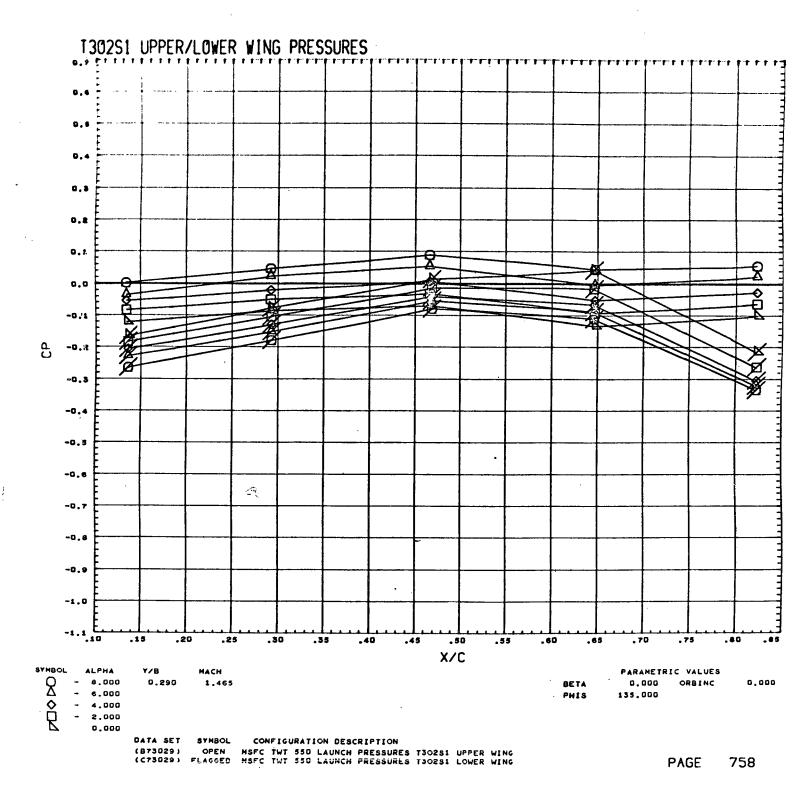


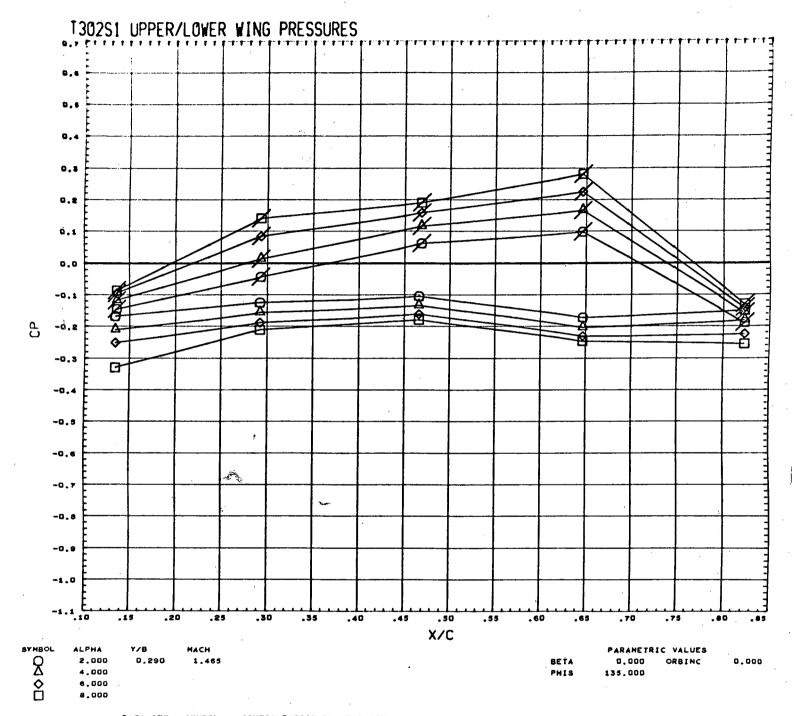


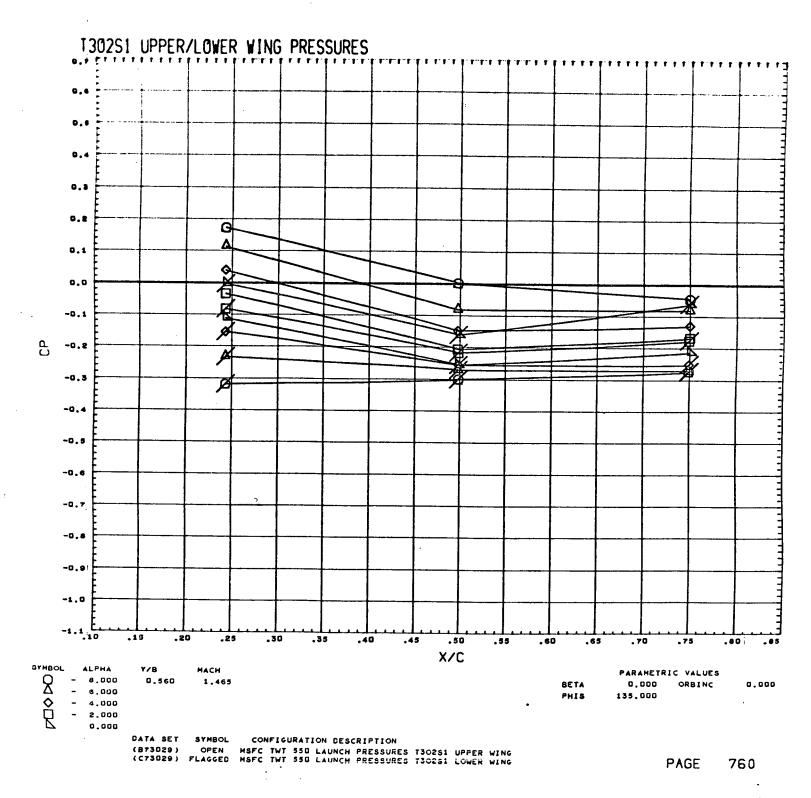
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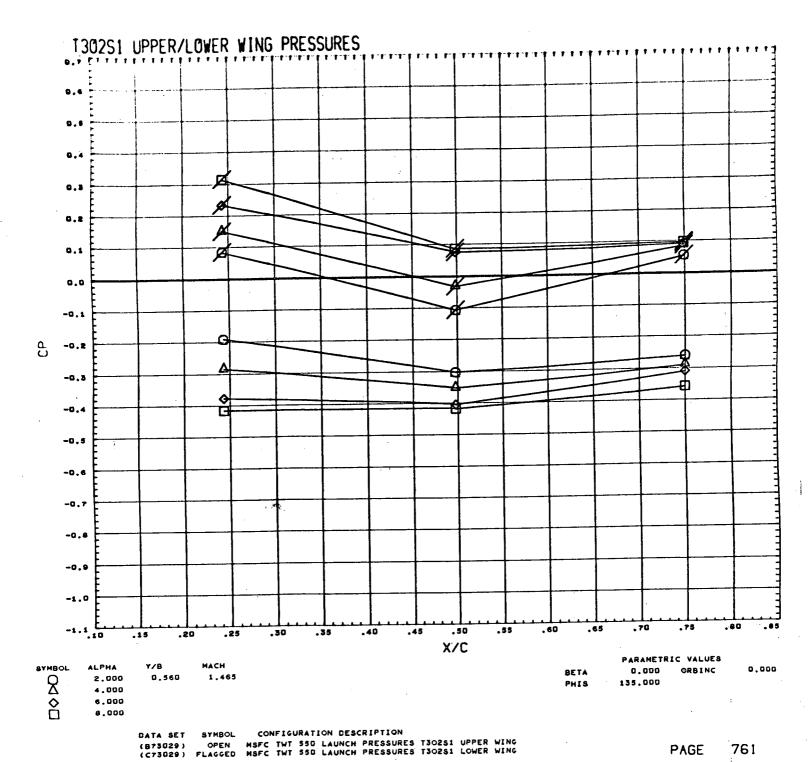
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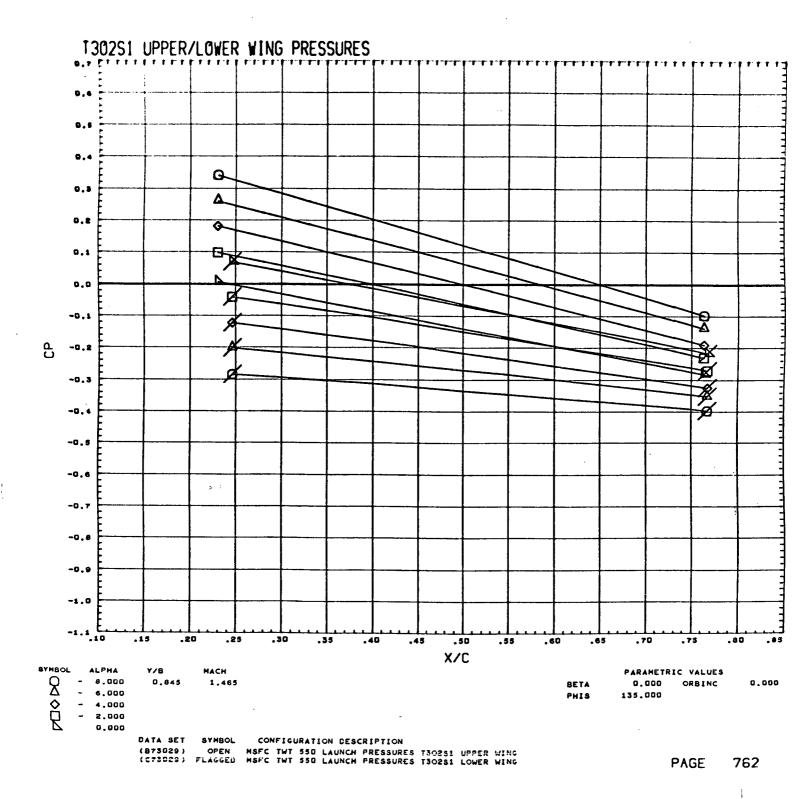


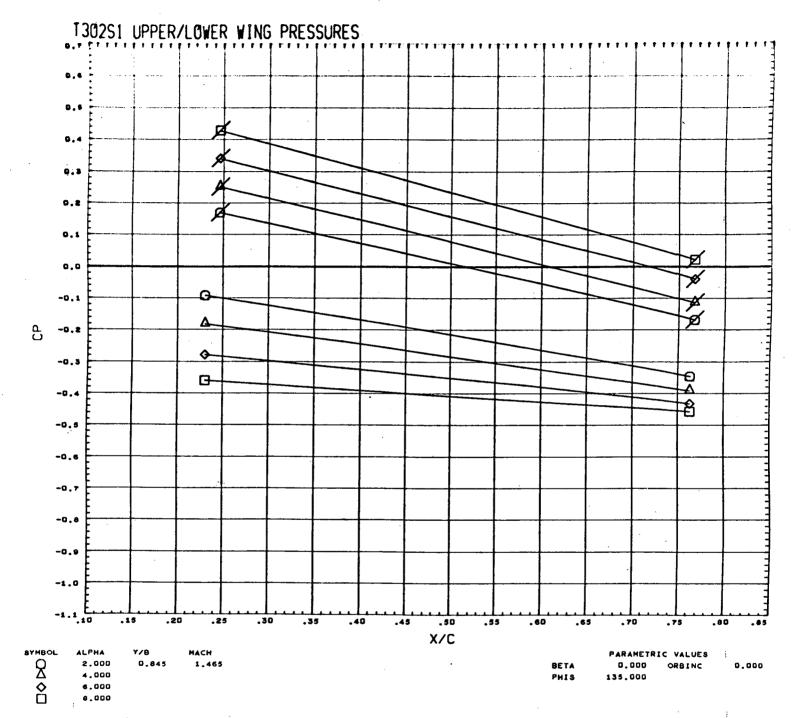


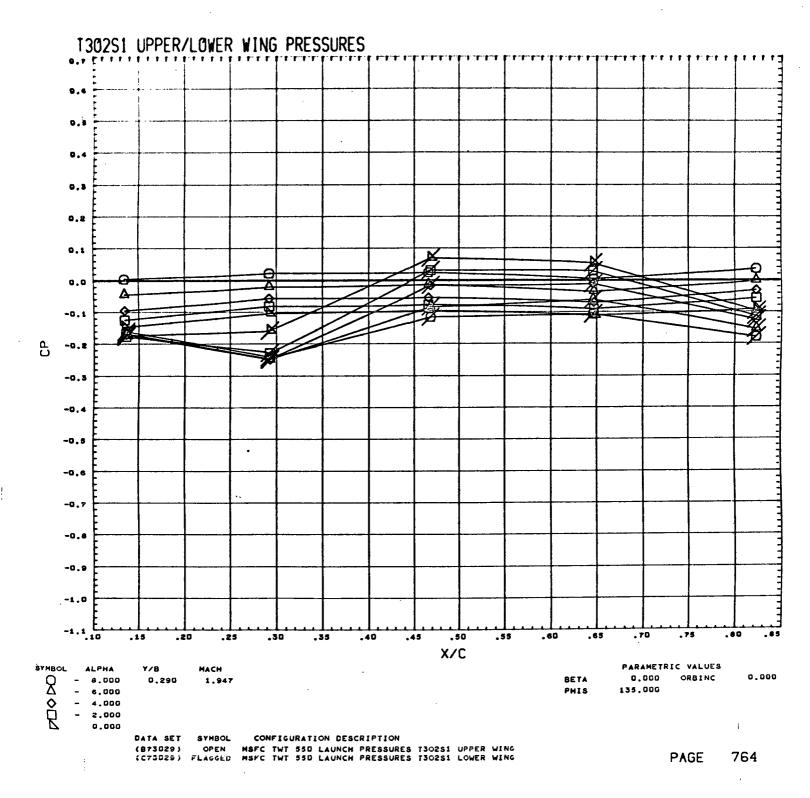


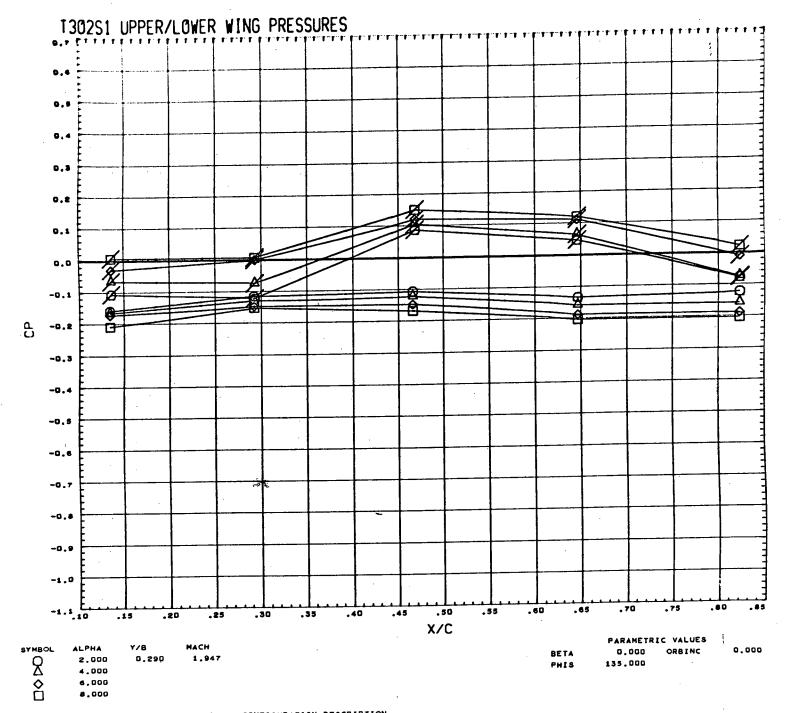


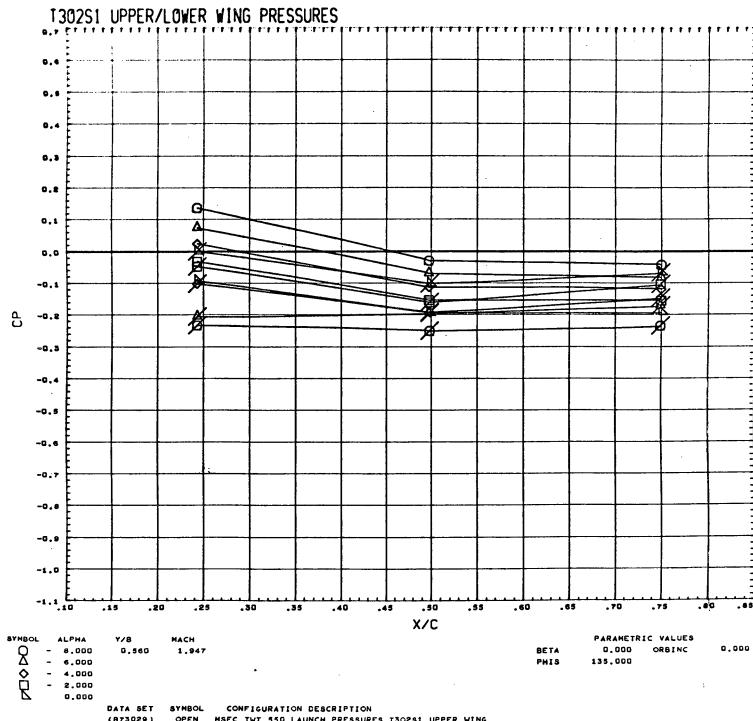


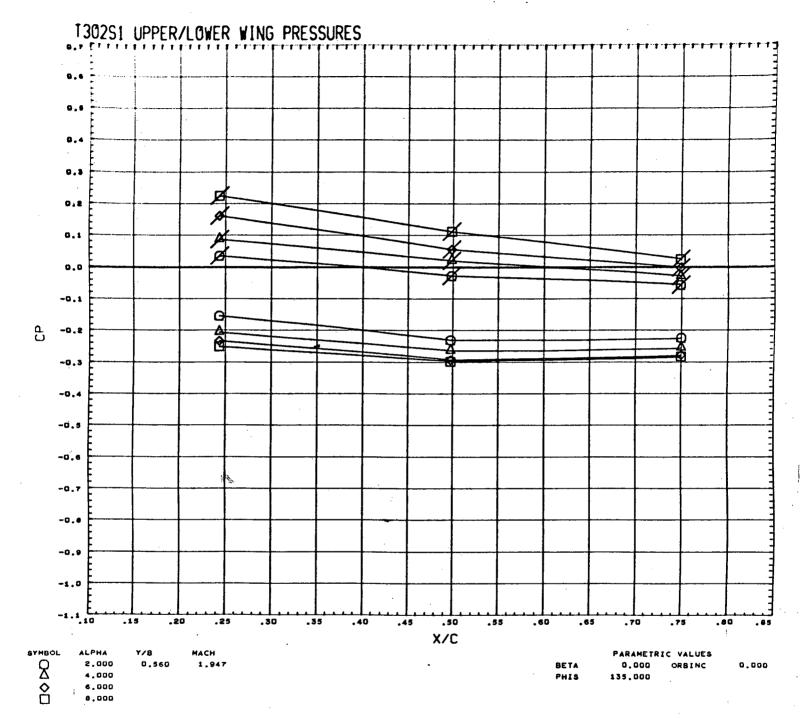


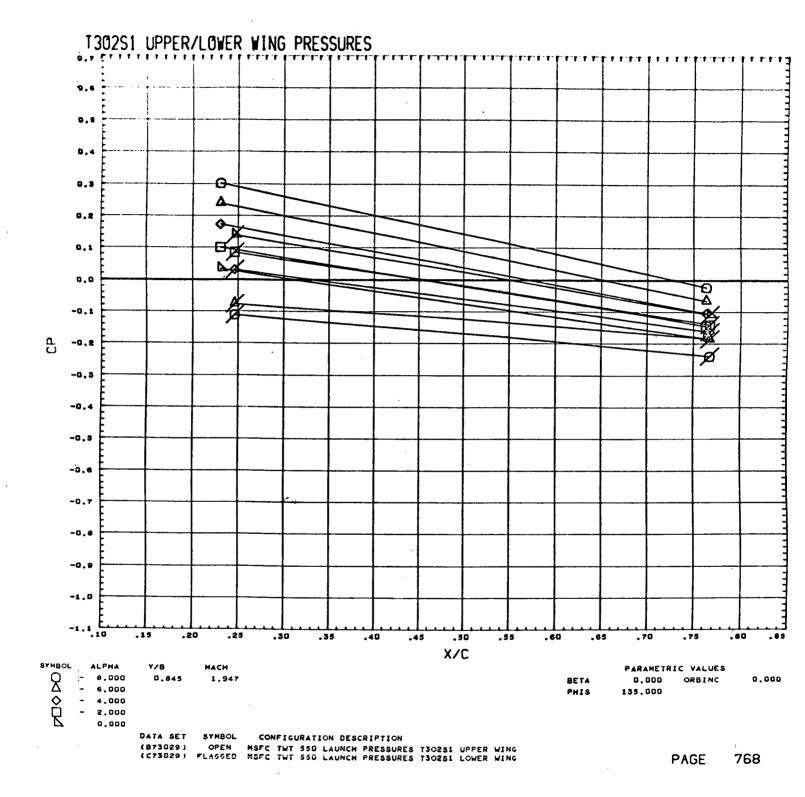


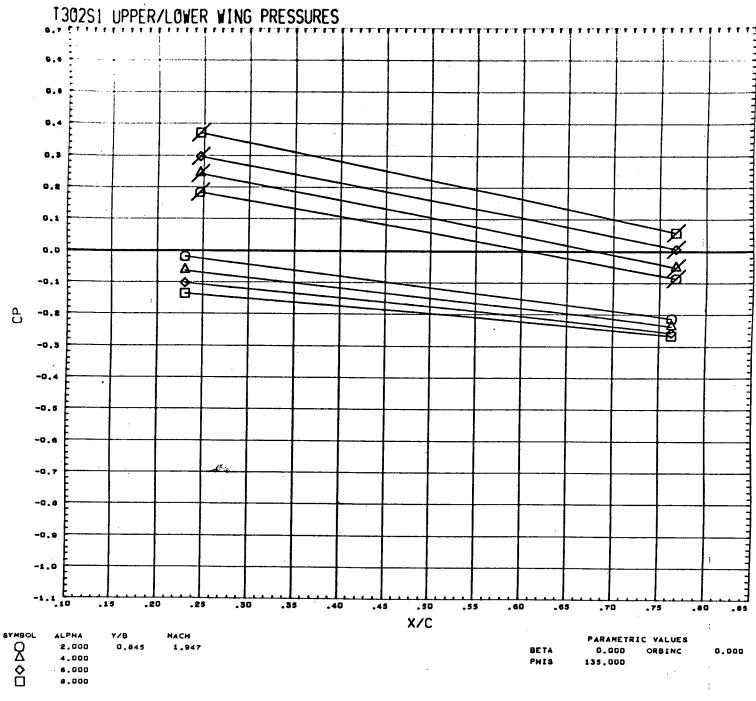


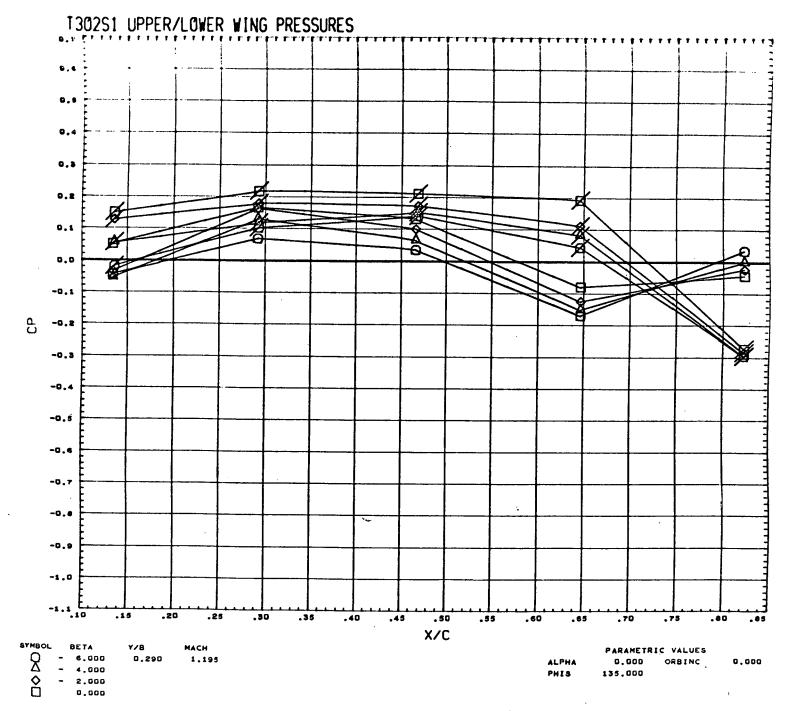


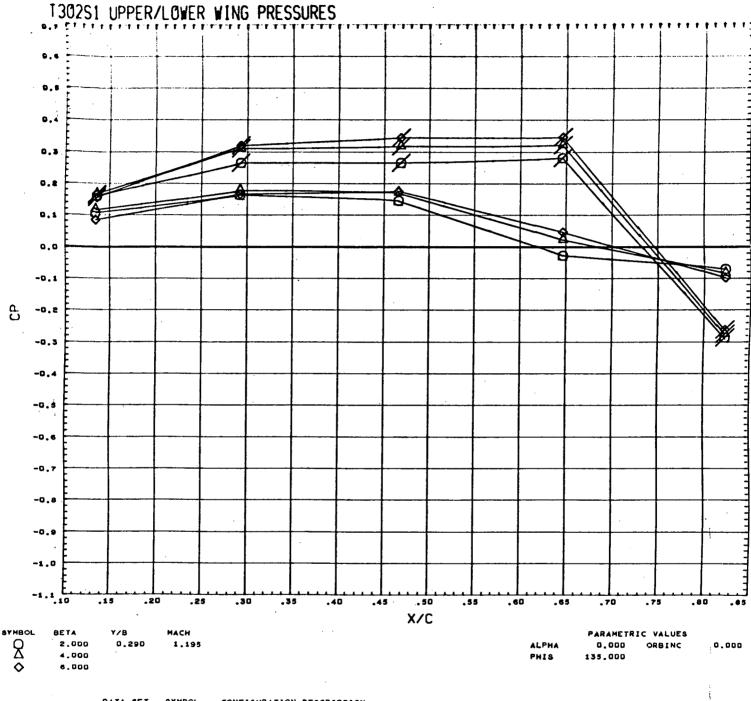


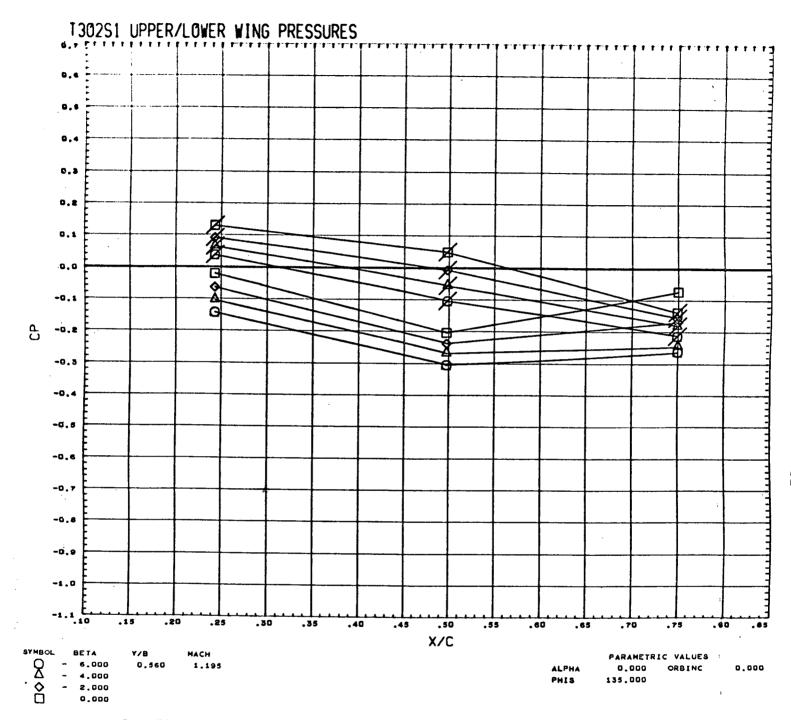


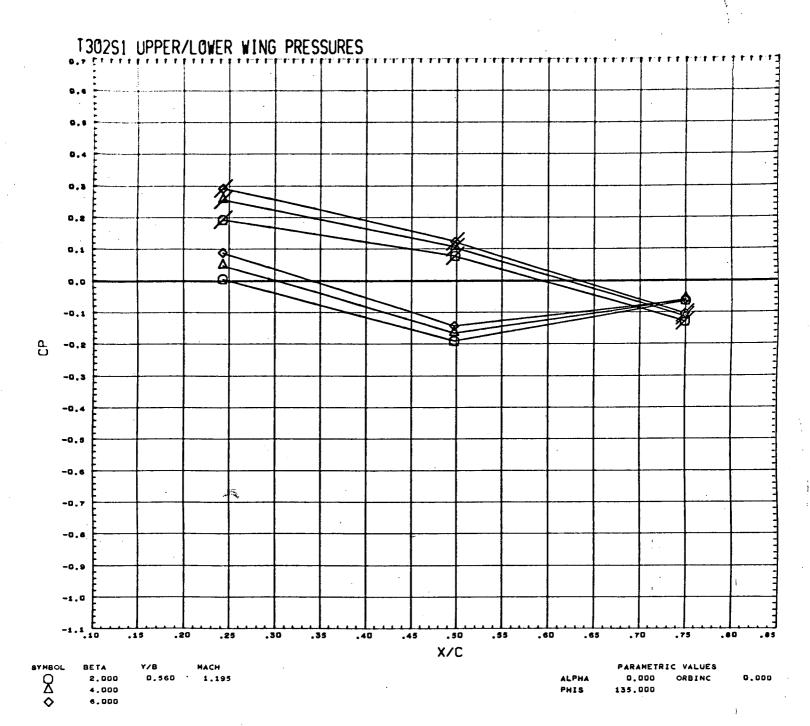


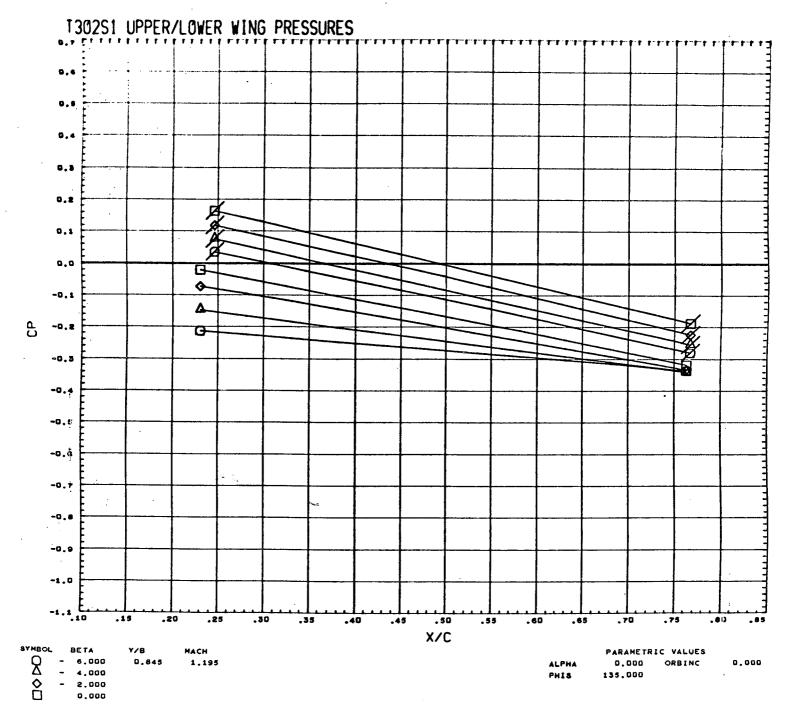


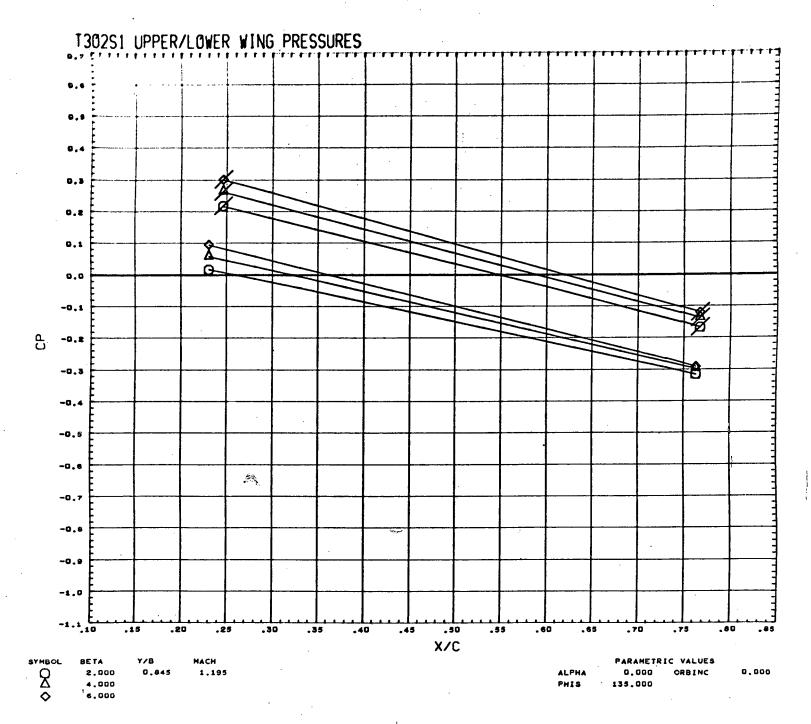






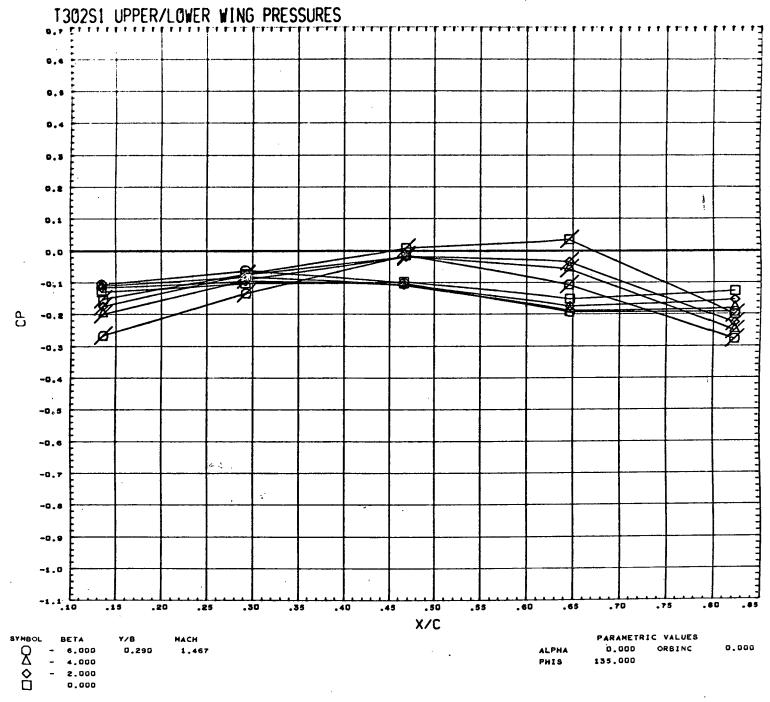






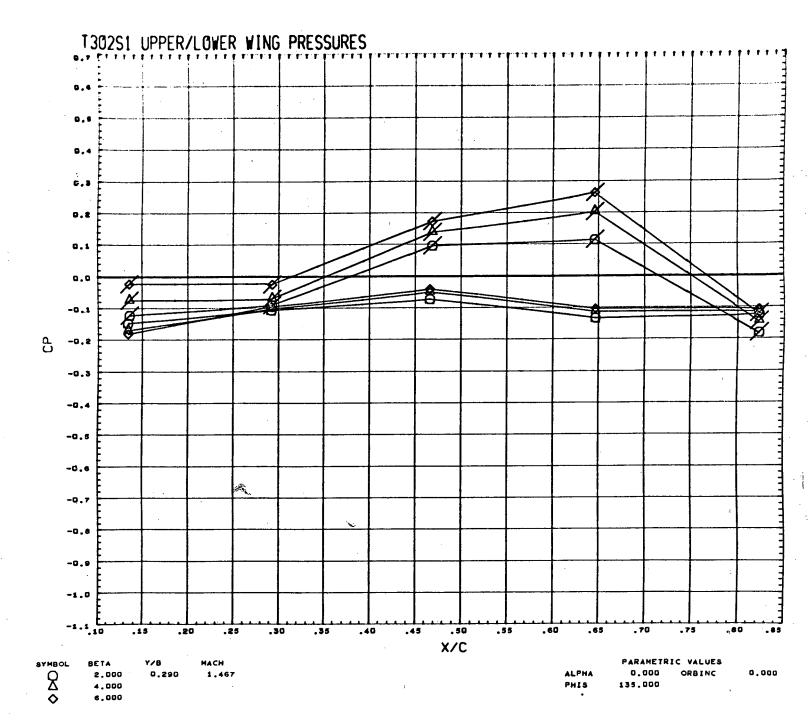
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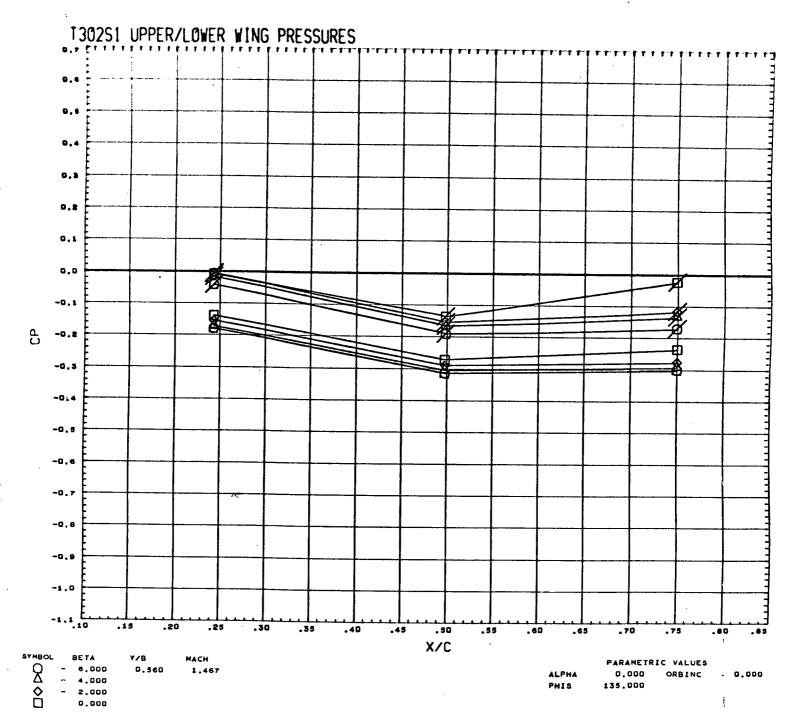
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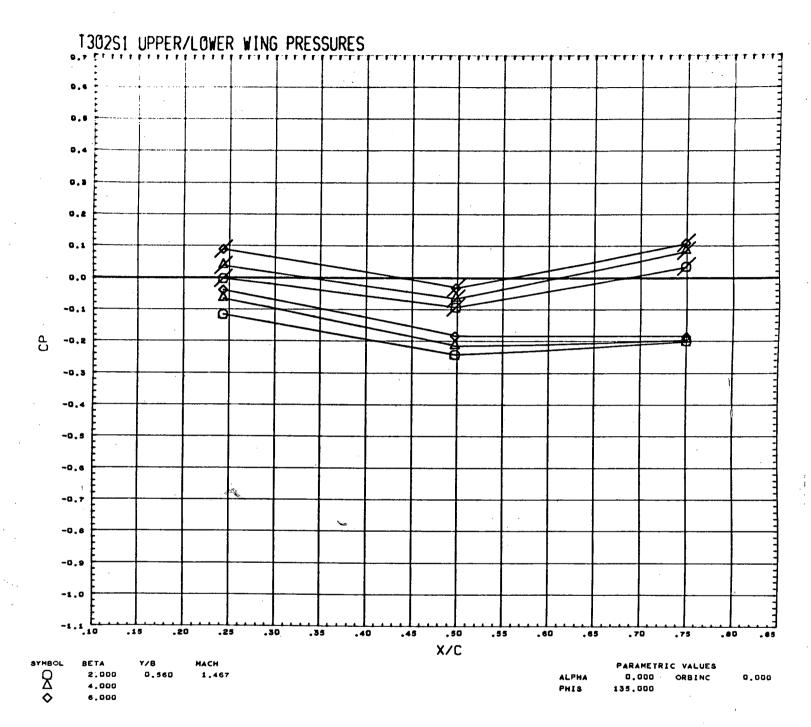


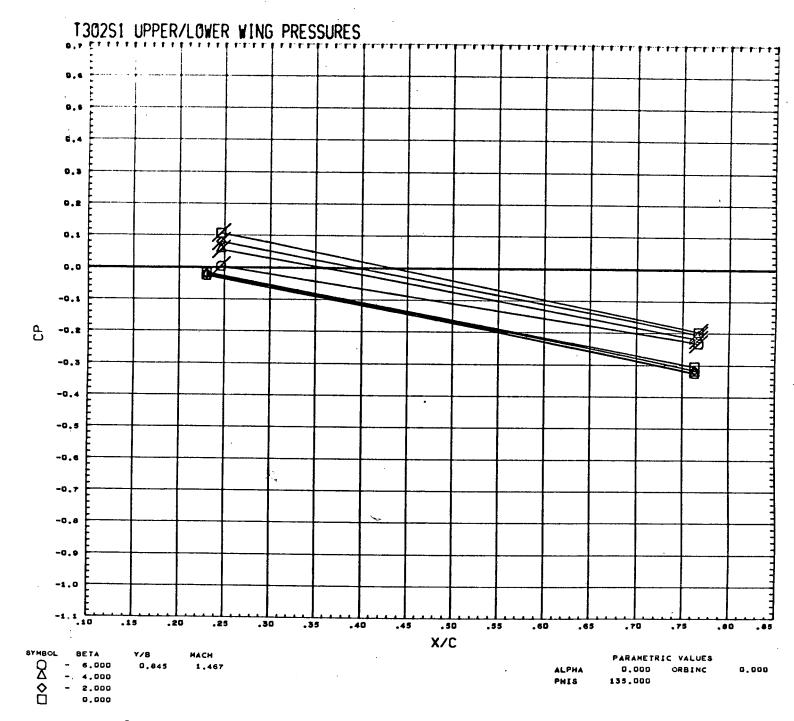
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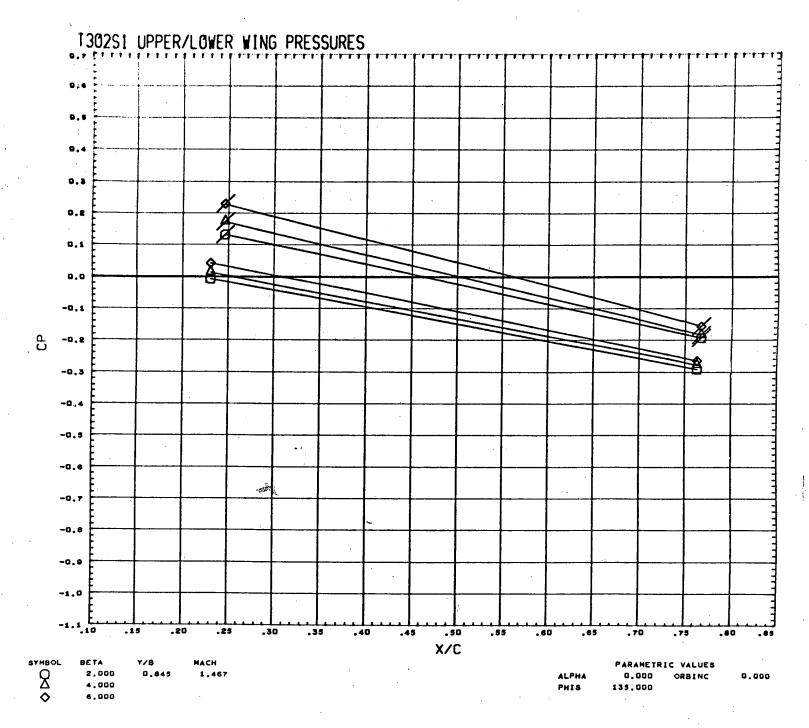
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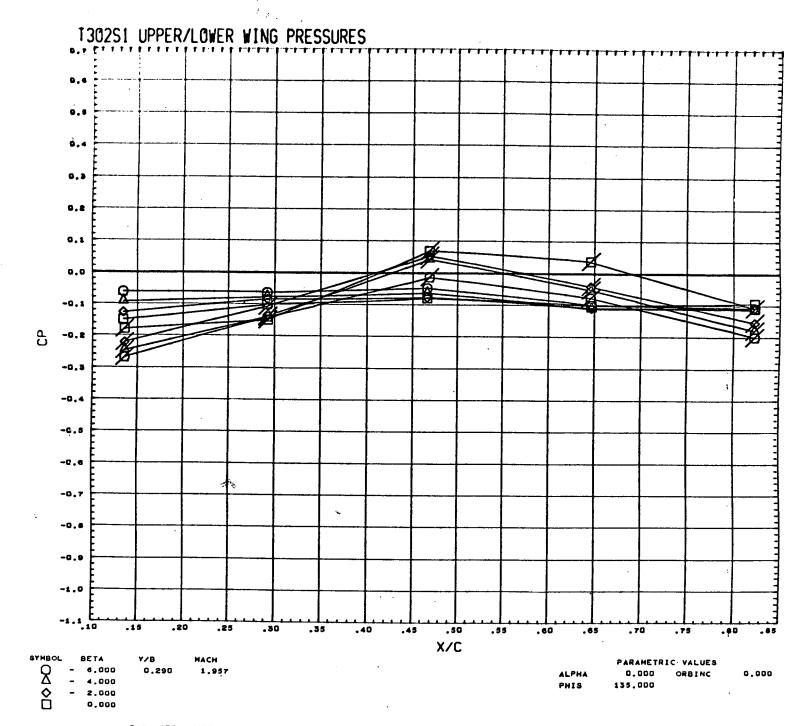


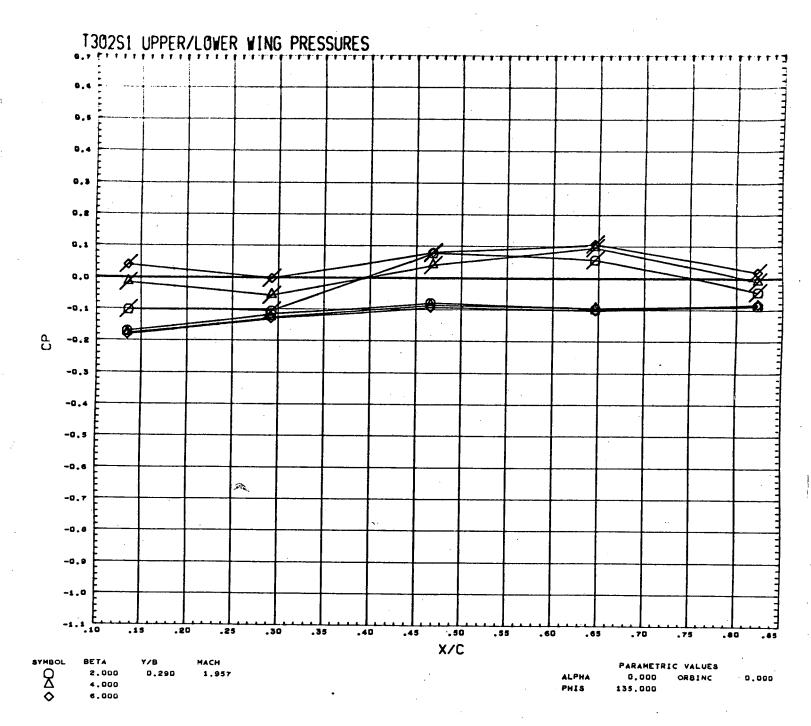


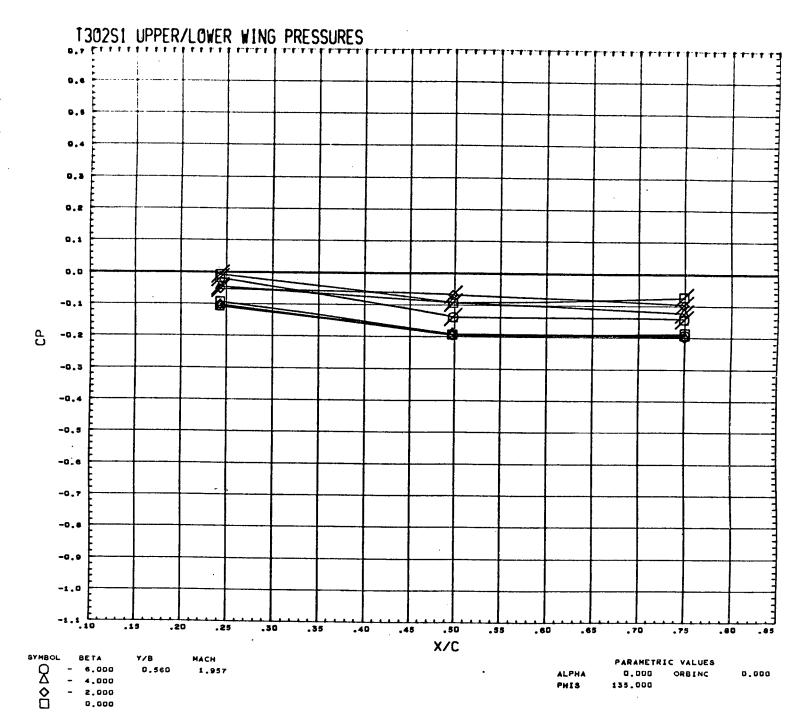


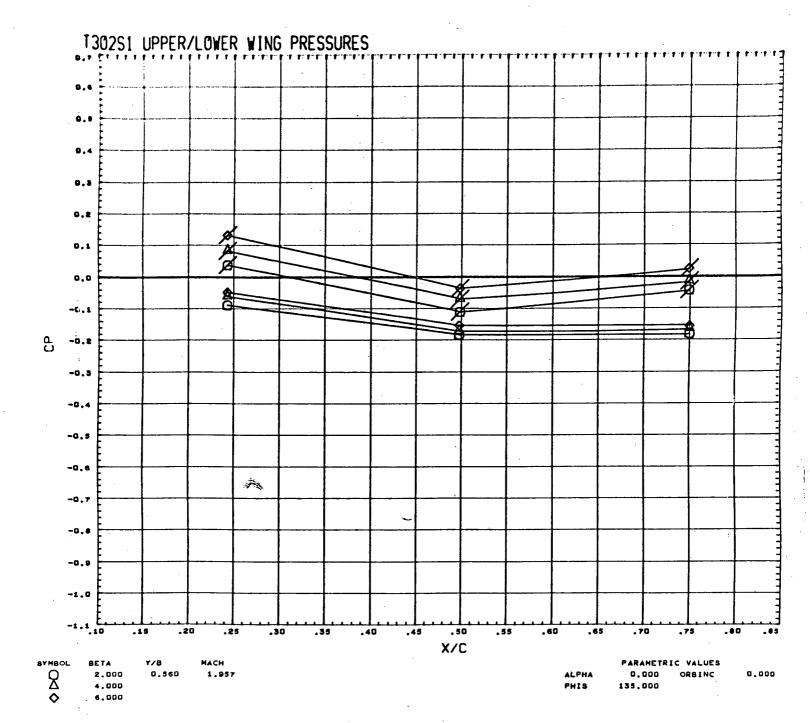


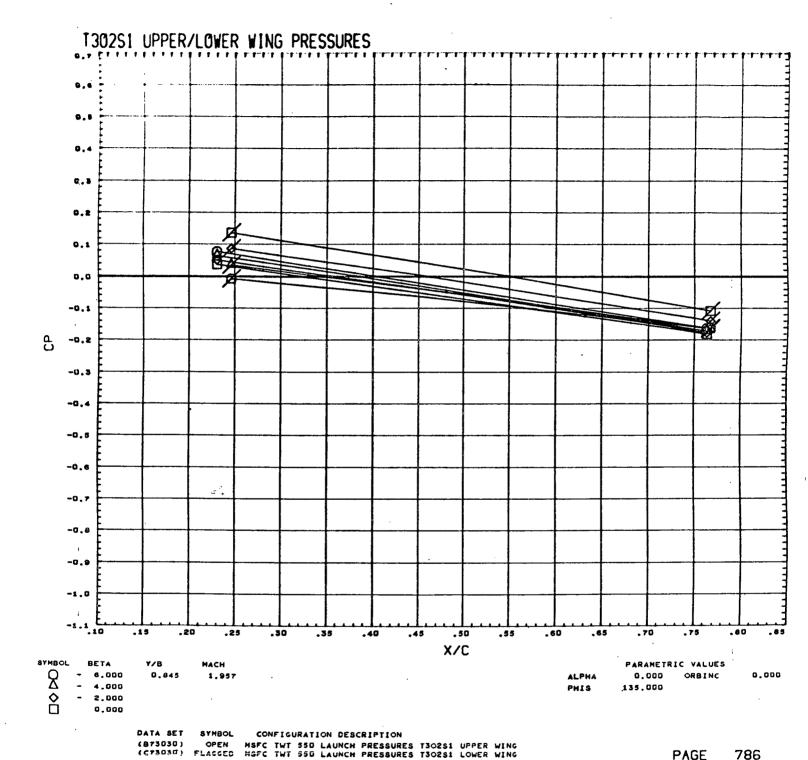


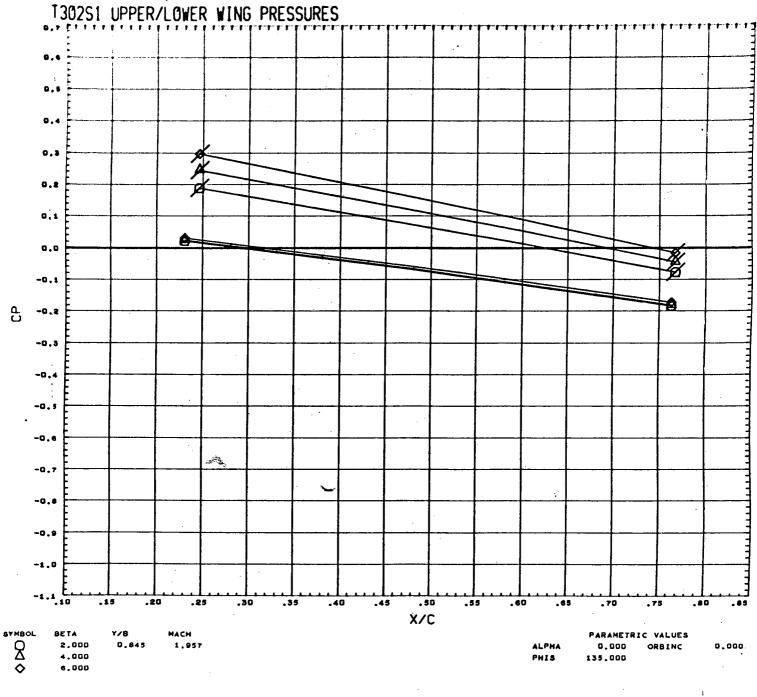




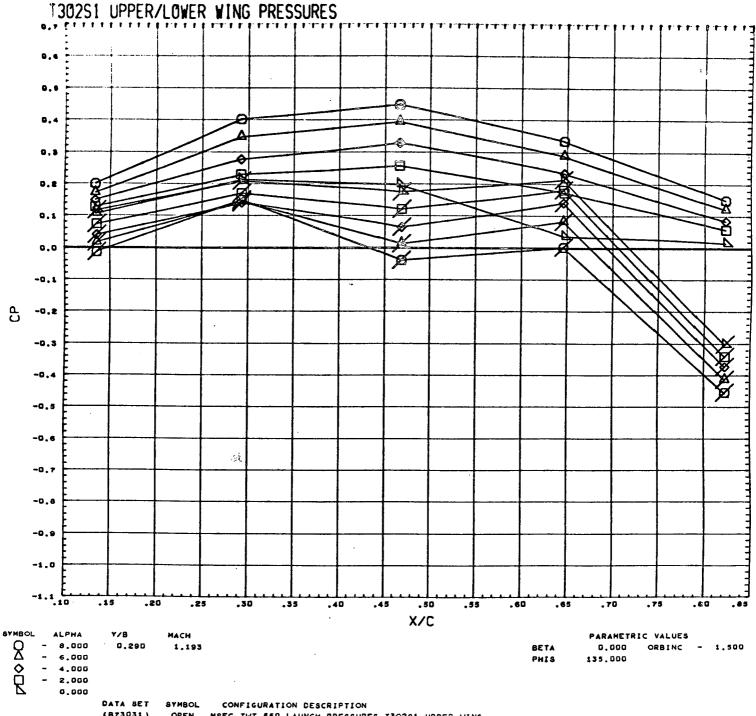




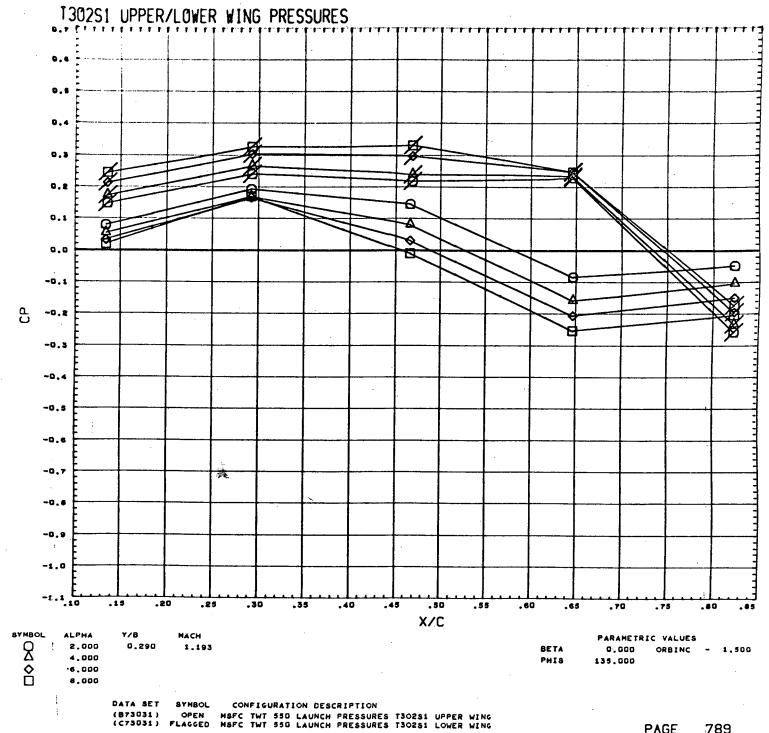


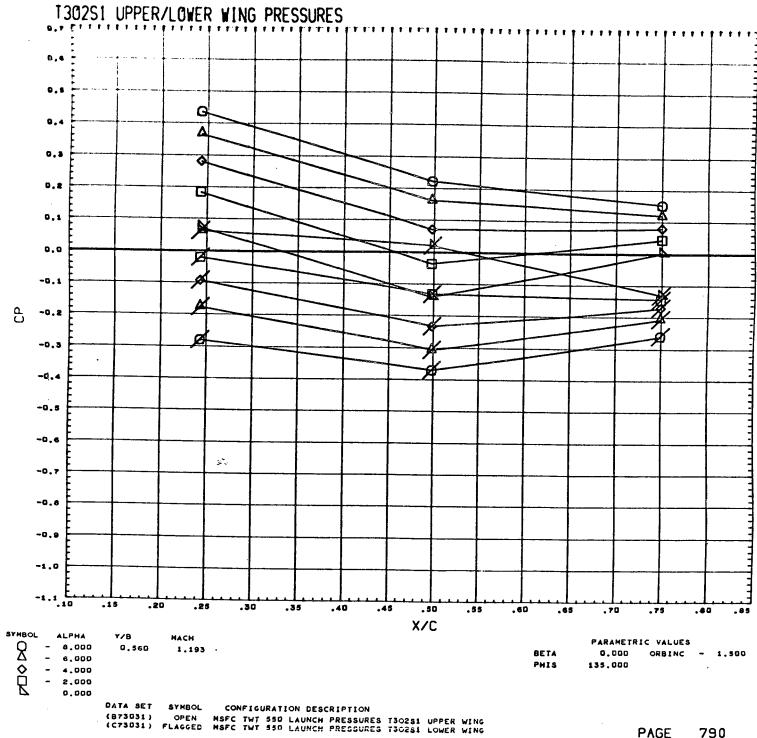


PAGE 7.87

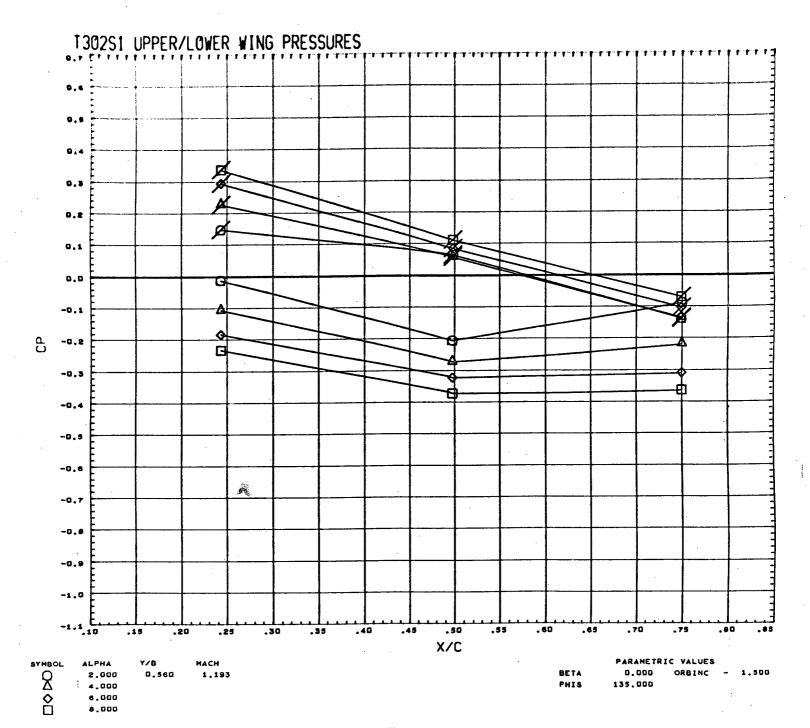


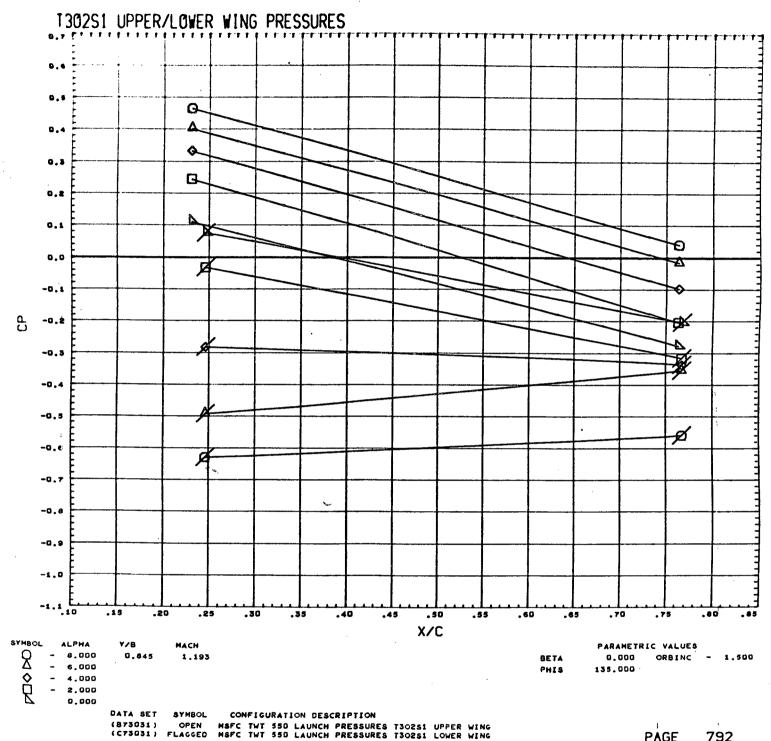
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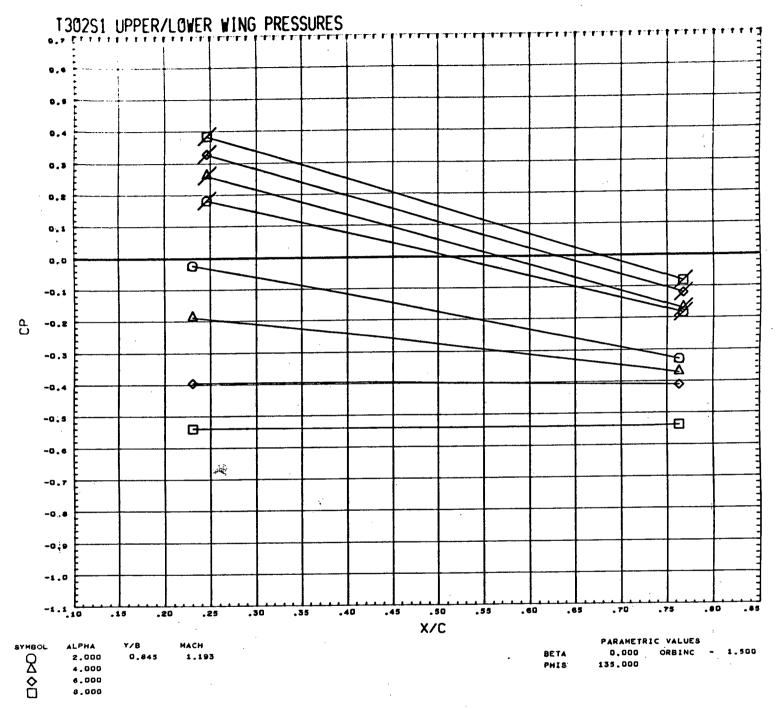


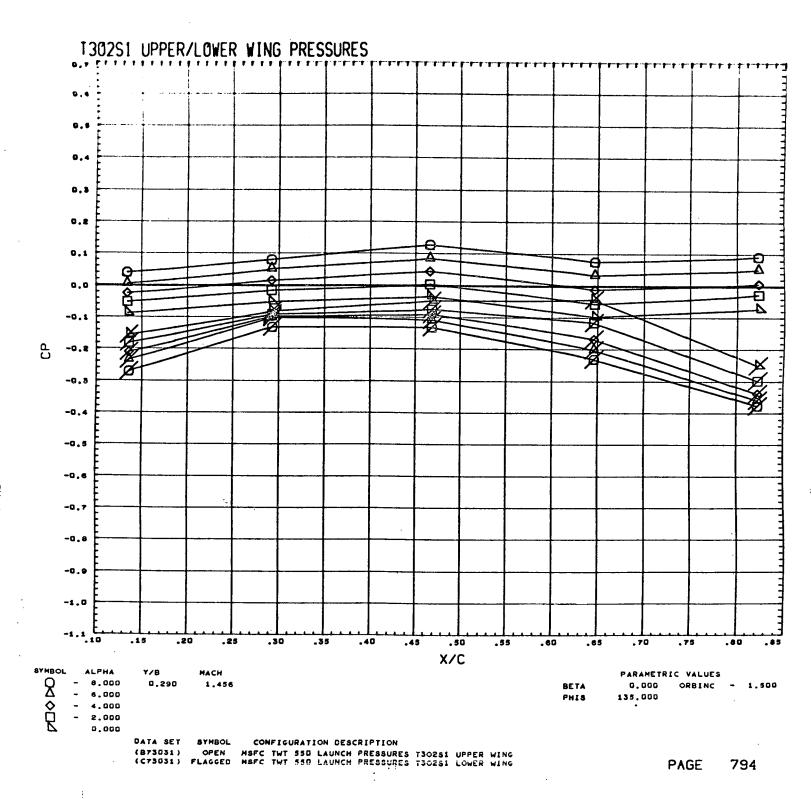


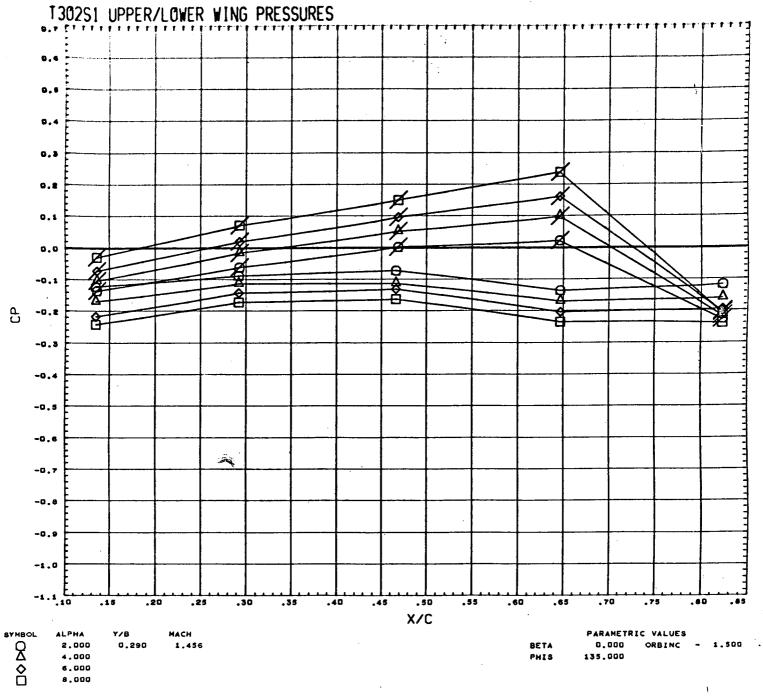
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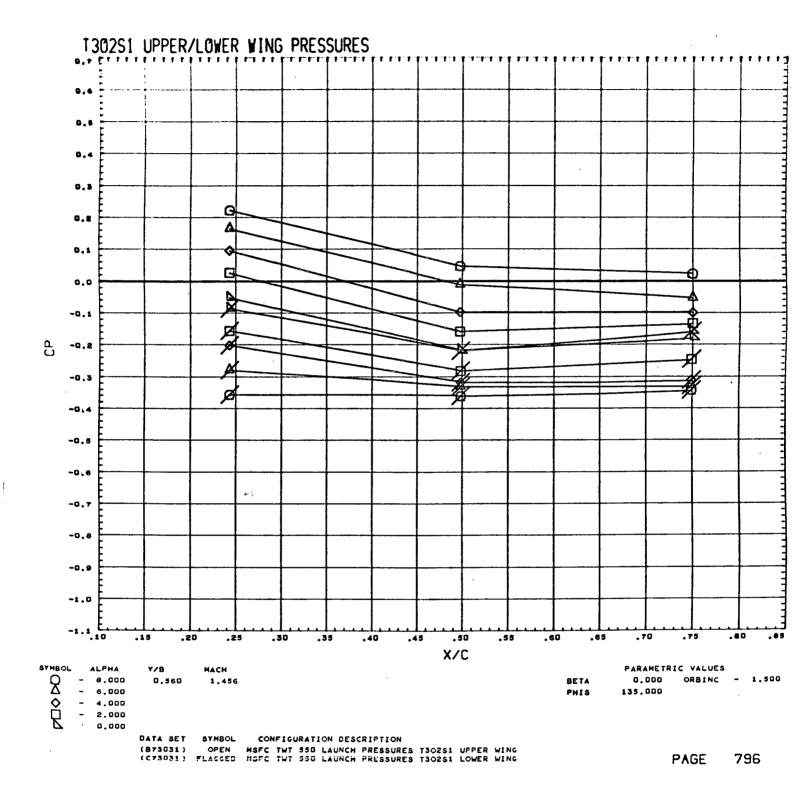


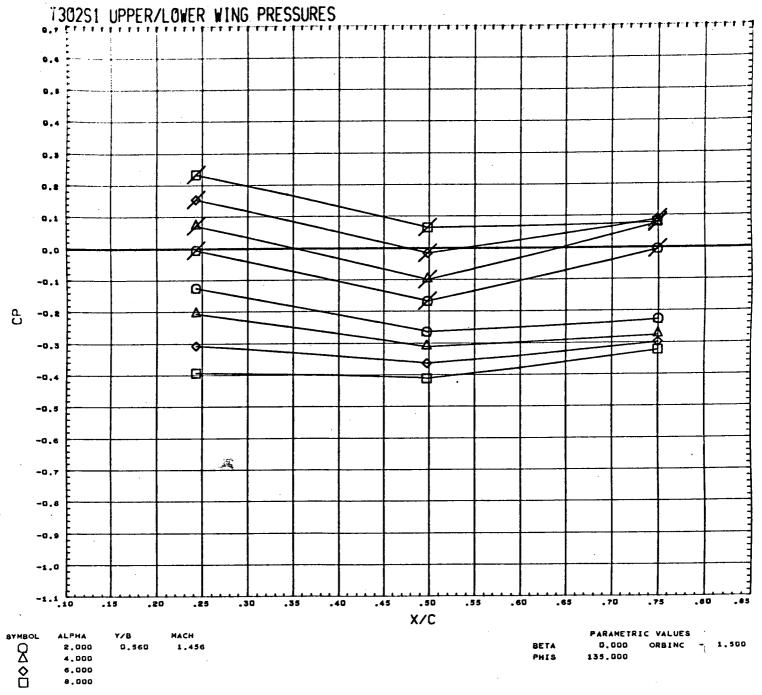






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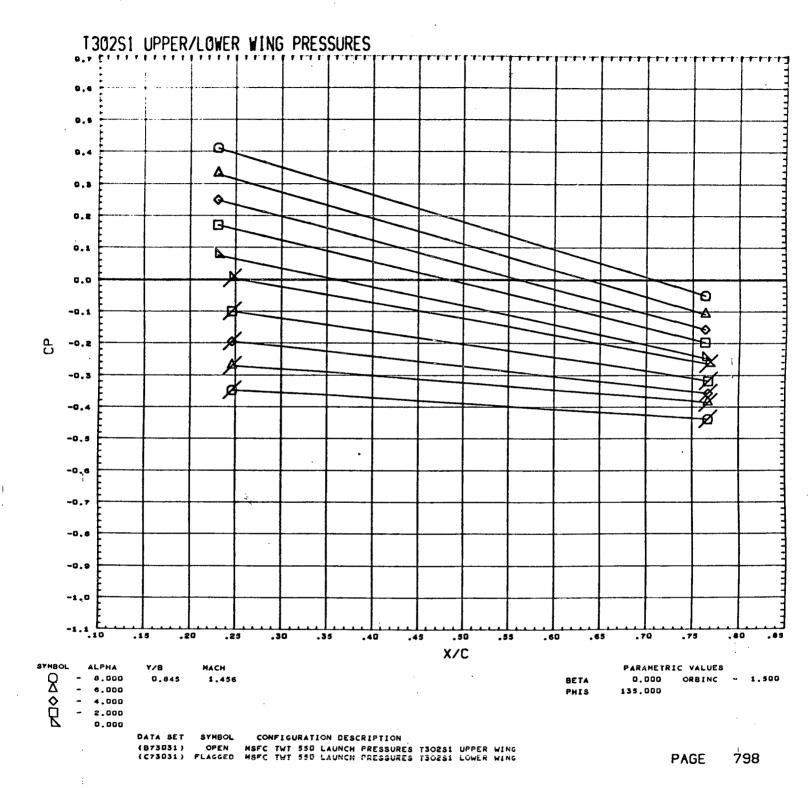


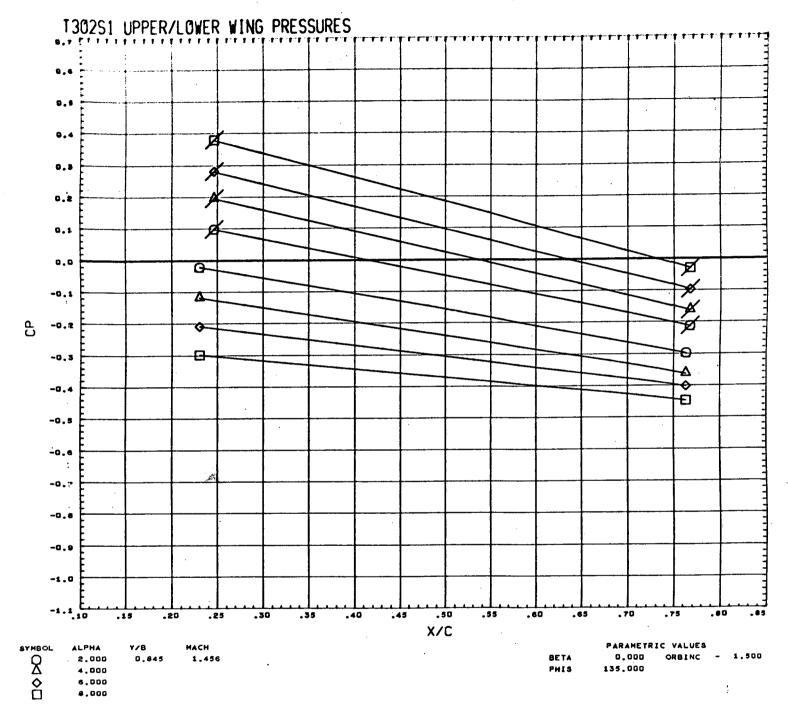


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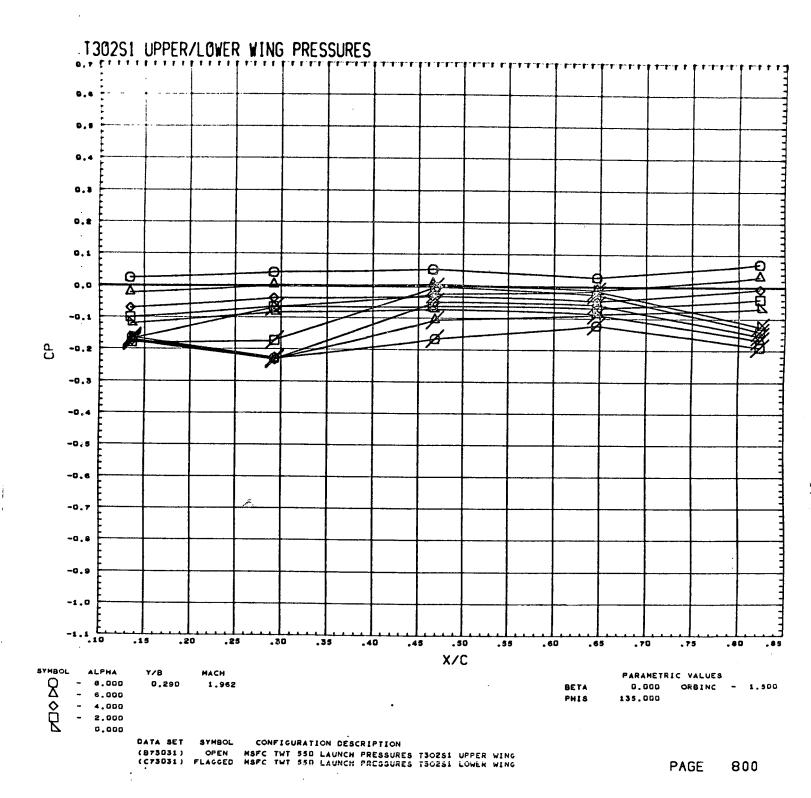
(C73031) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

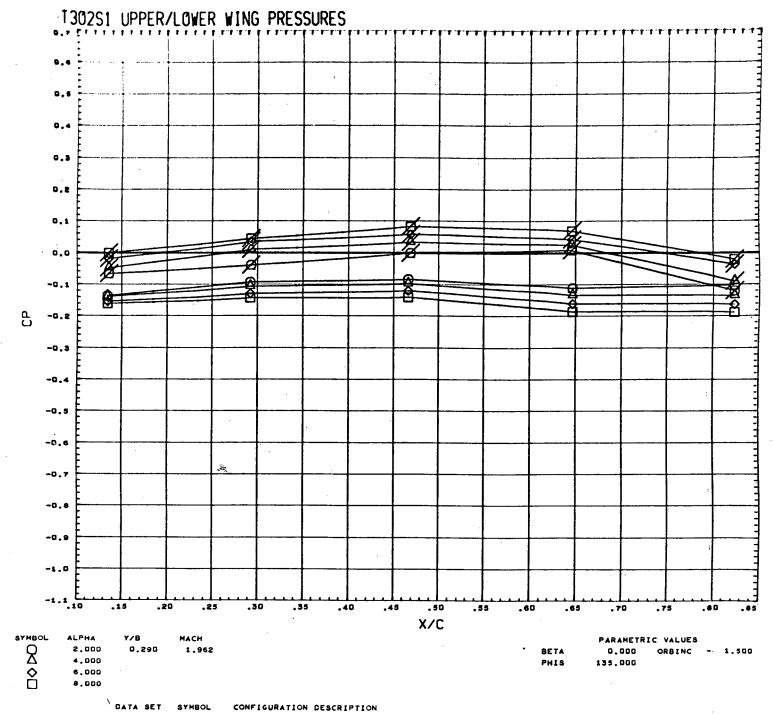




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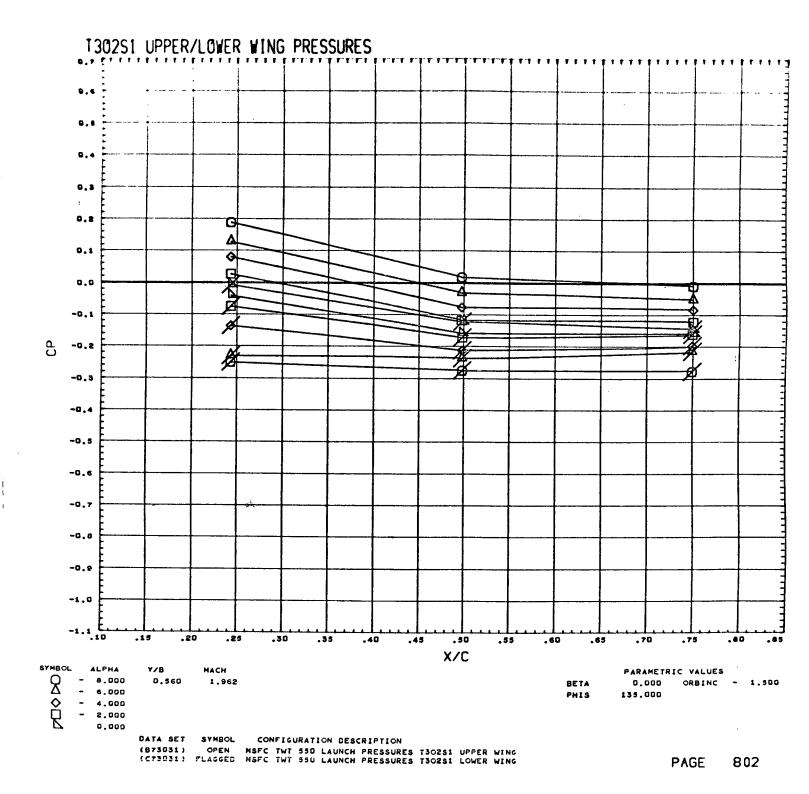
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(C73D31) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T302S1 LOWER WING

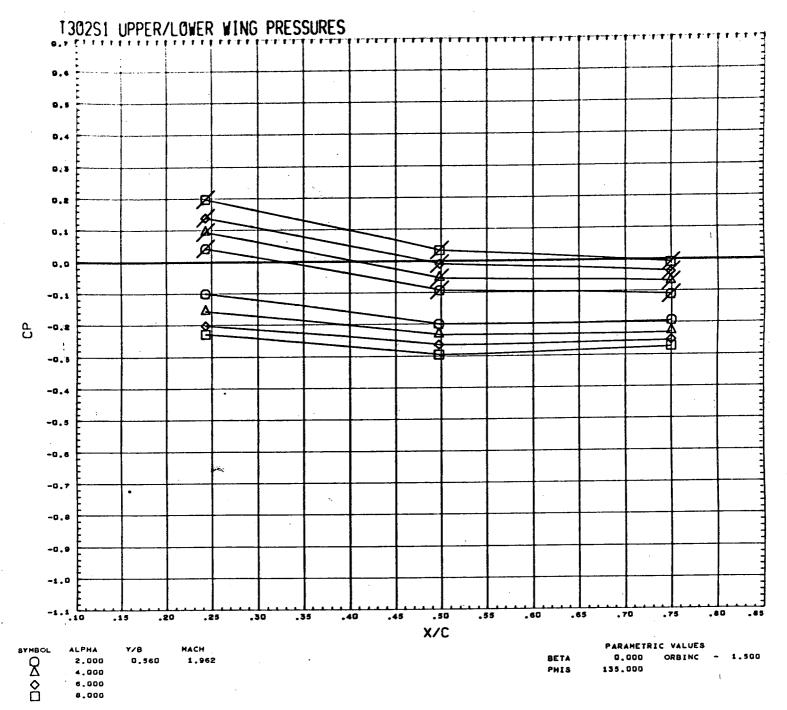




DATA SET SYMBOL CONFIGURATION DESCRIPTION

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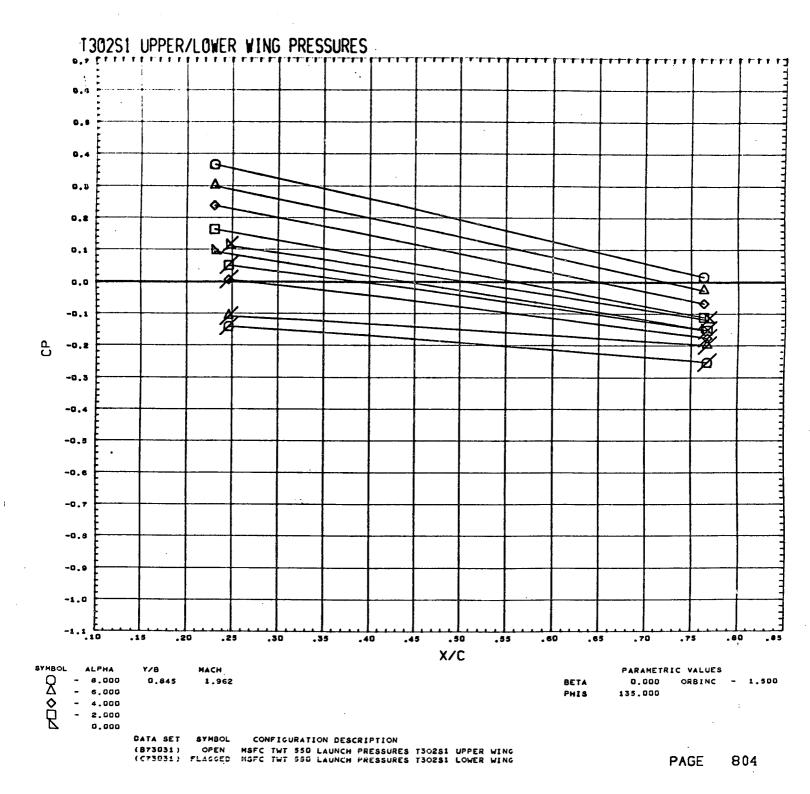


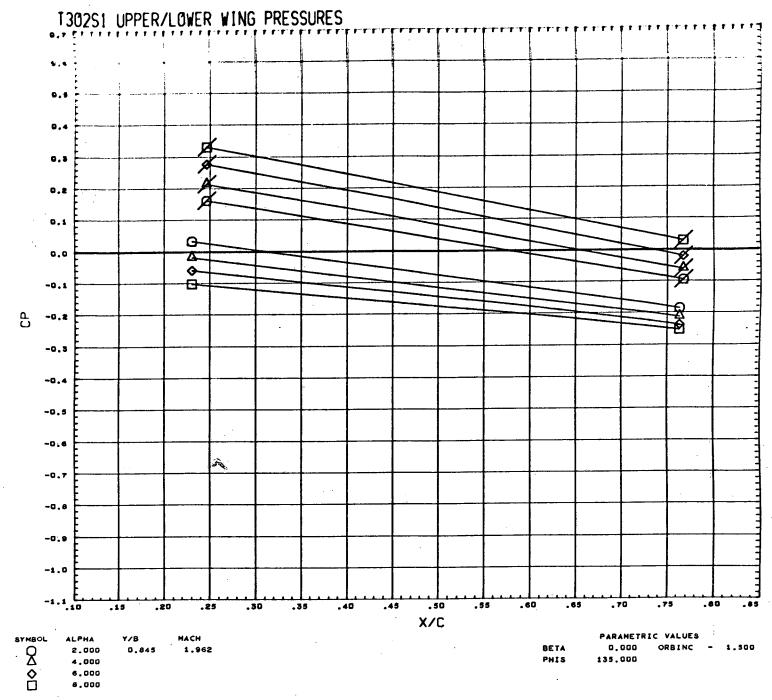


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873031) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C73031) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

PAGE 803

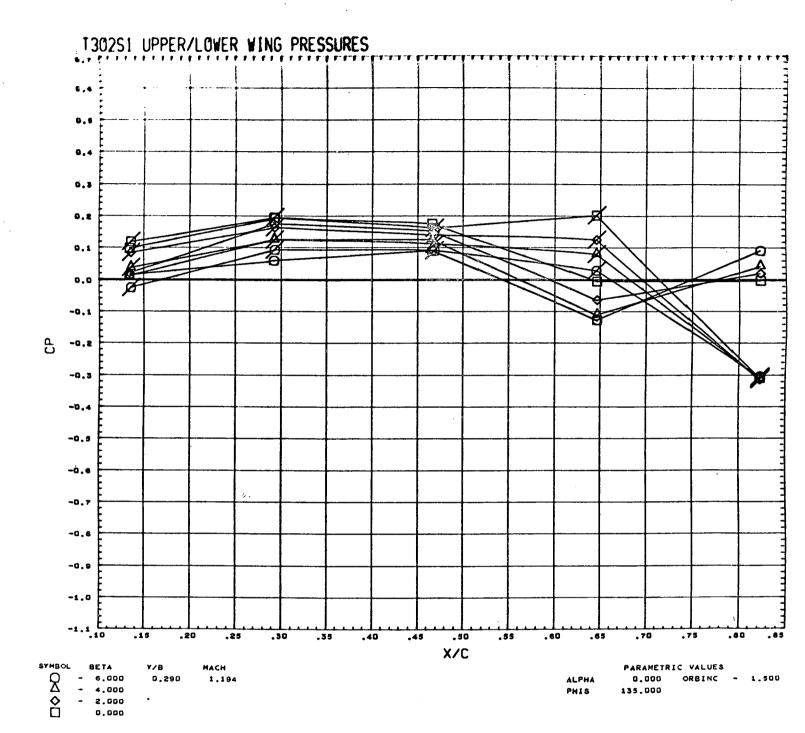
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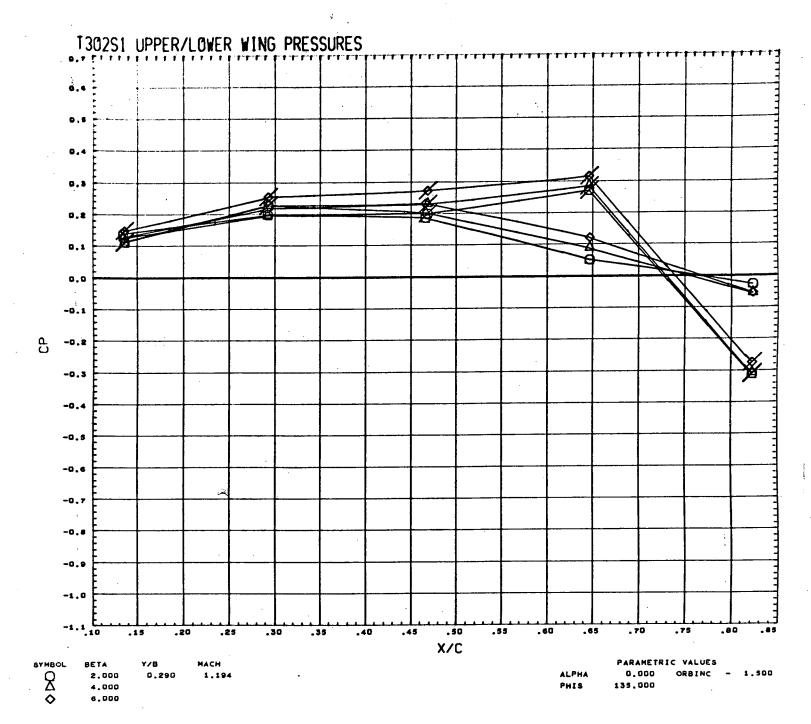
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(C73031) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73032) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING

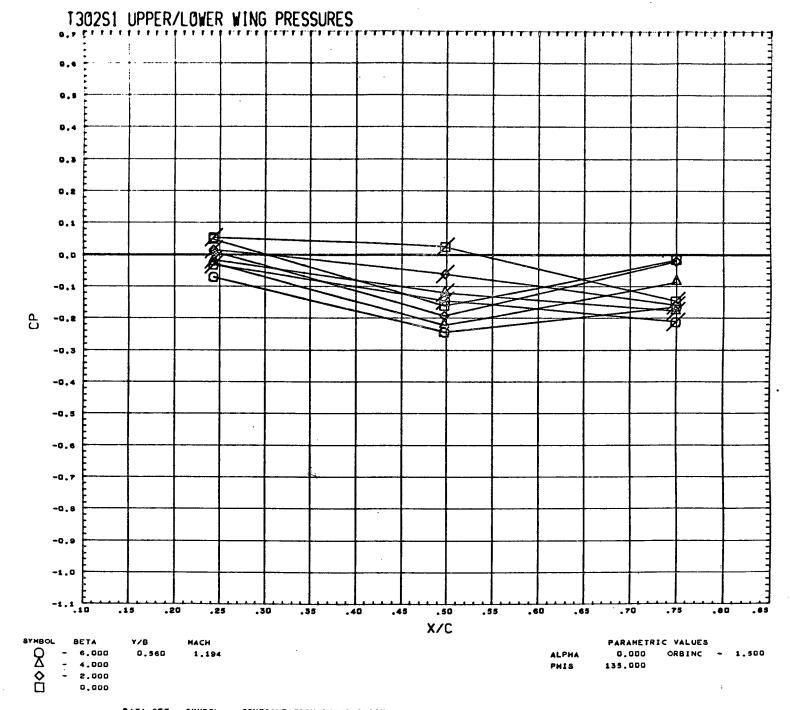
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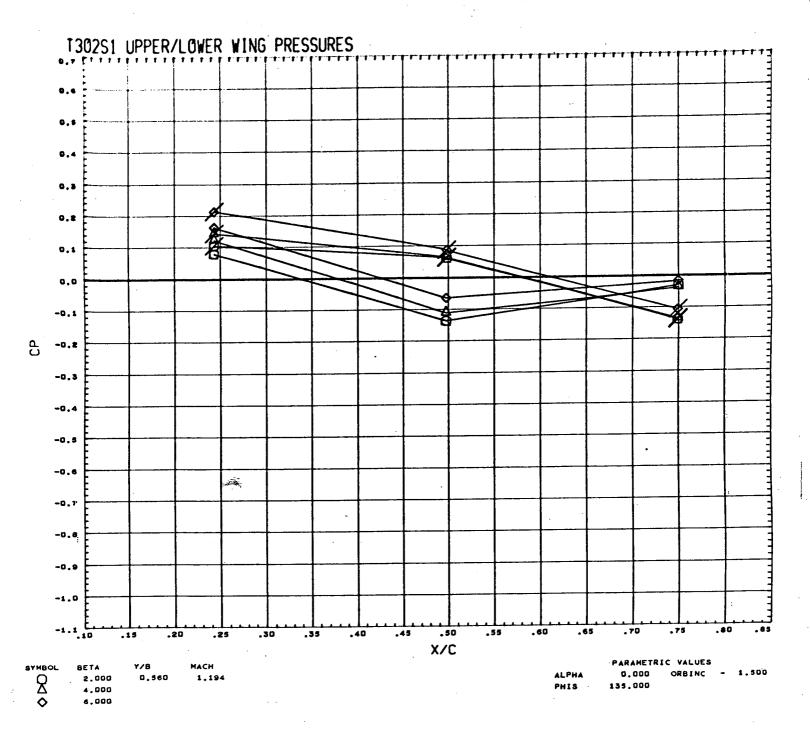


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873032) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

DATA SET SYMBOL CONFIGURATION DESCRIPTION.

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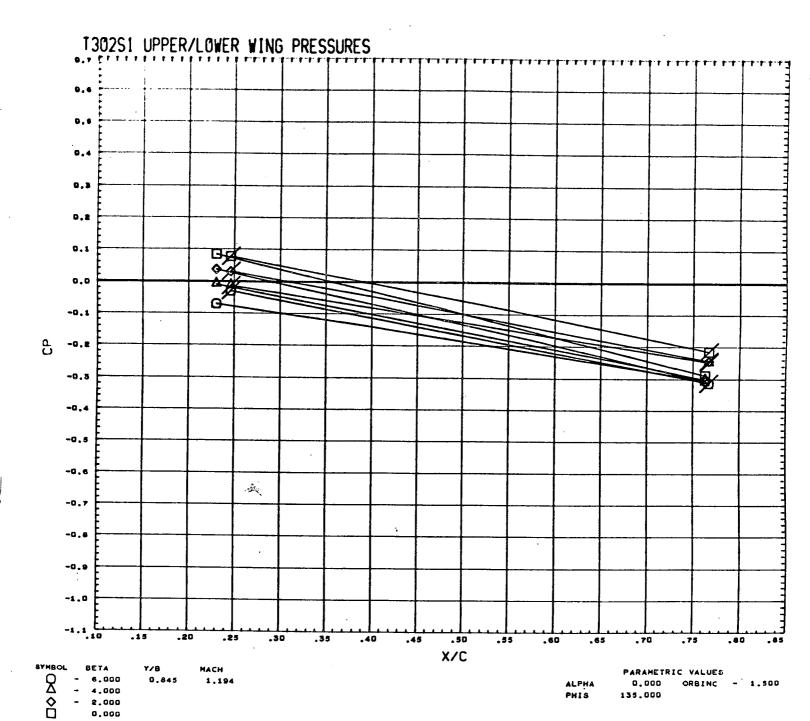




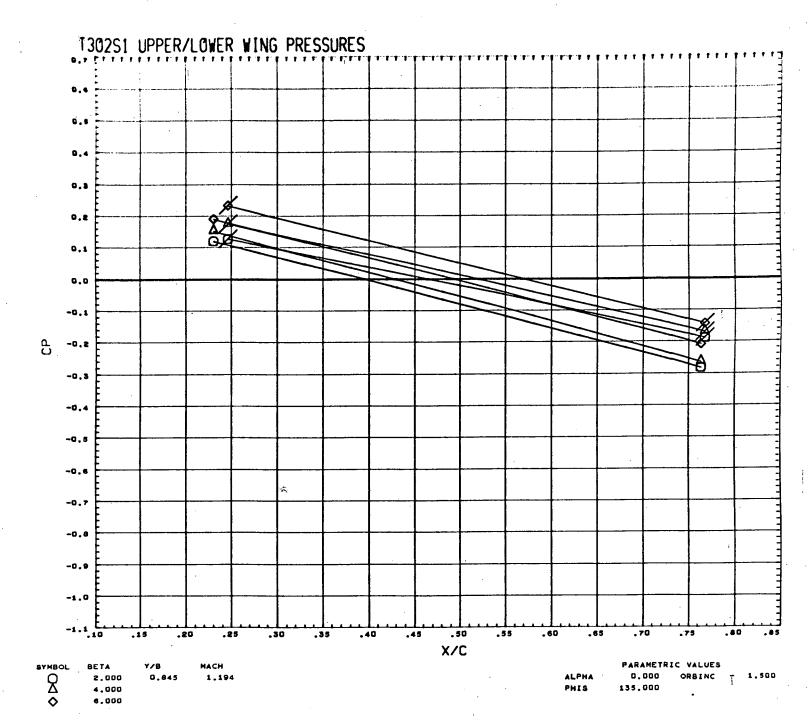
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(B73032) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING

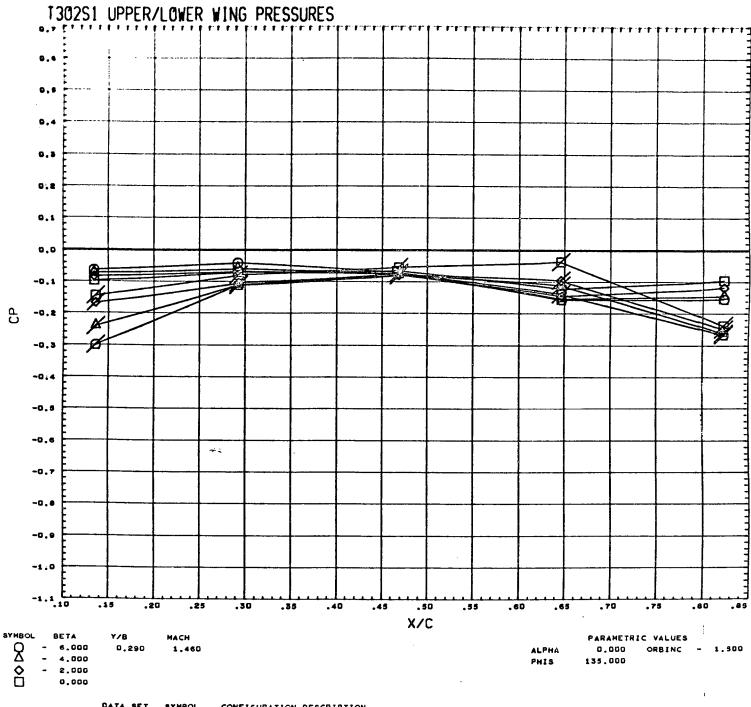
(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



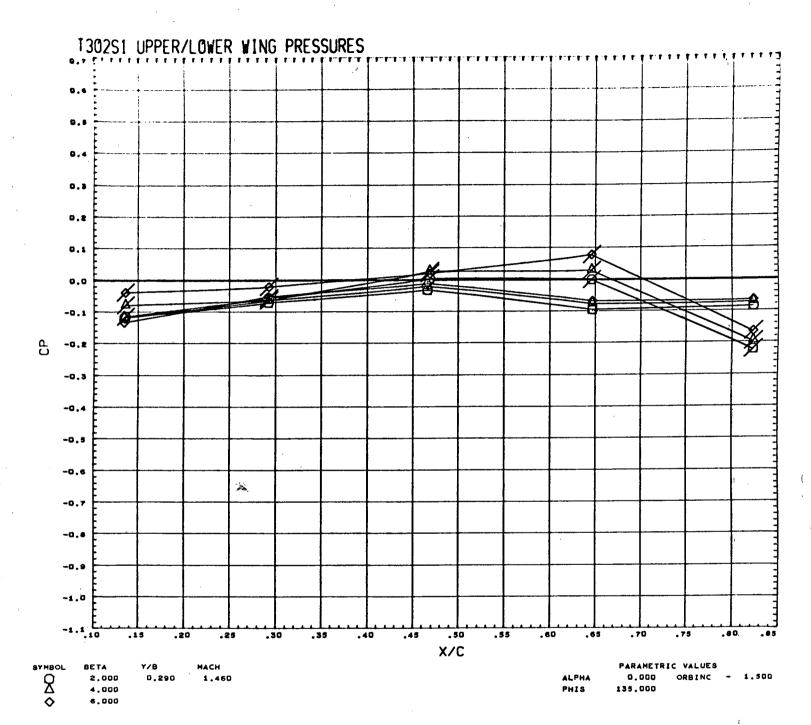
DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

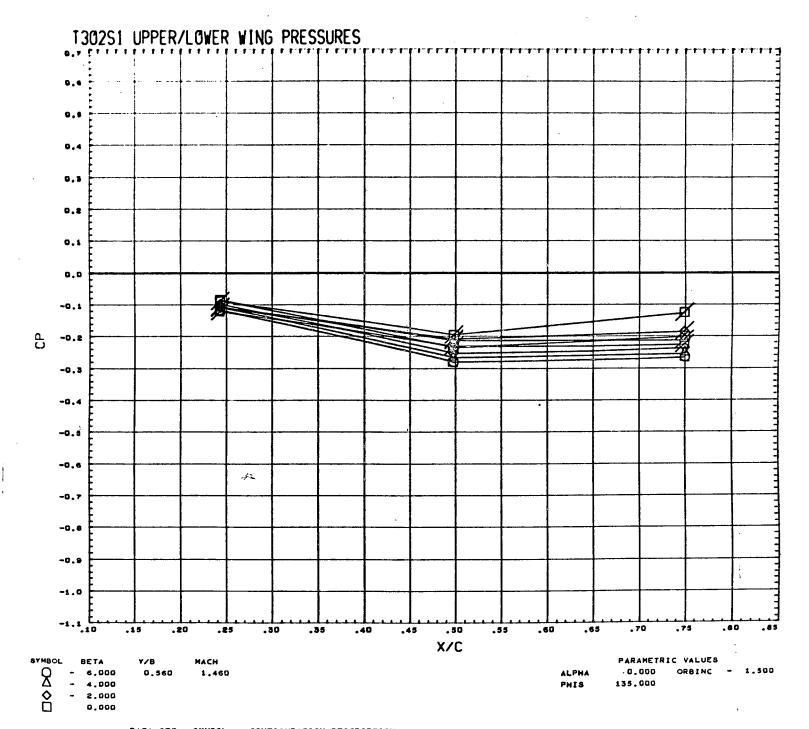


DATA SET SYMBOL CONFIGURATION DESCRIPTION
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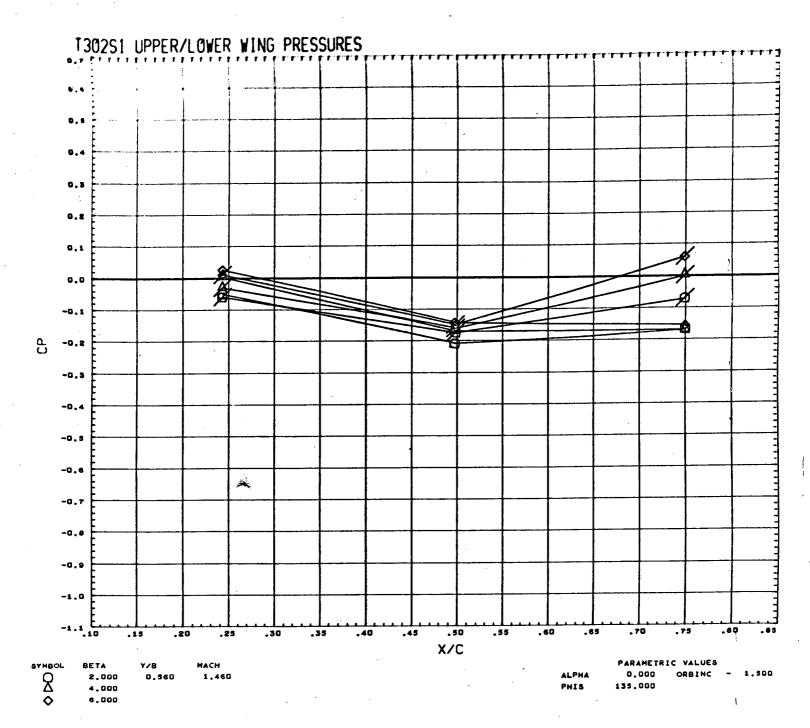
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(C73032) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T302S1 LOWER WING

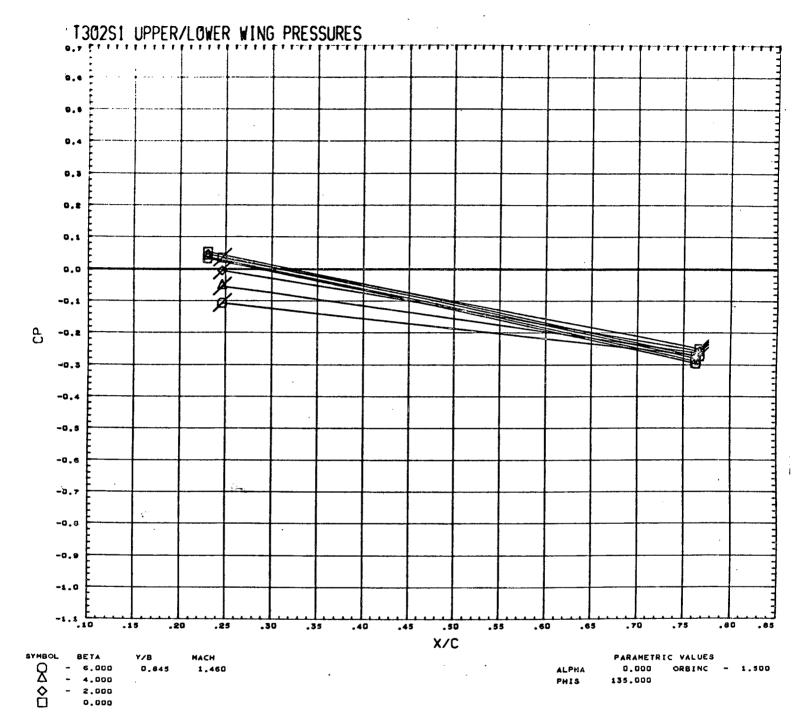


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING

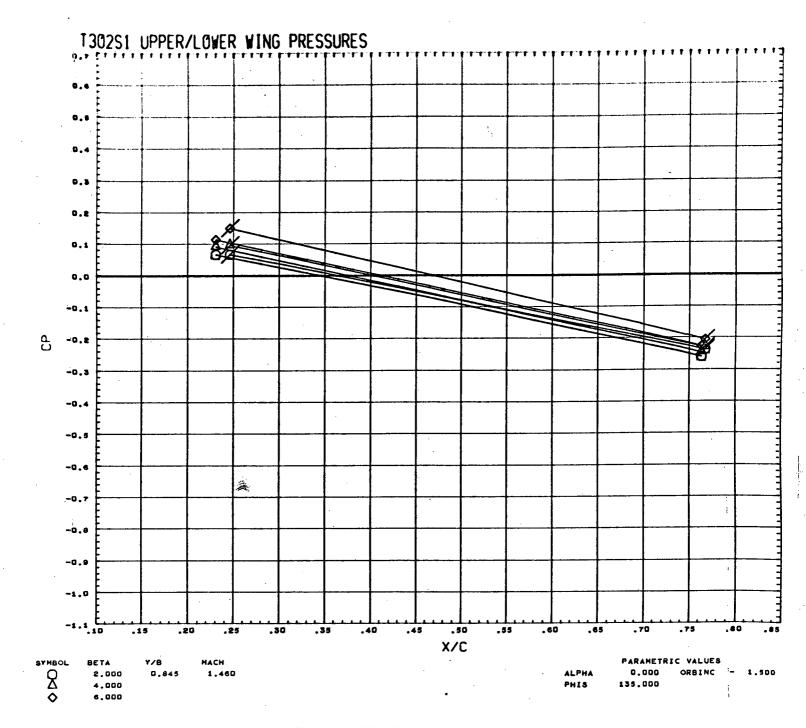


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(873032) OPEN MSFC TWT 530 LAUNCH PRESSURES T302S1 UPPER WING
(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



OATA SET SYMBOL CONFIGURATION DESCRIPTION

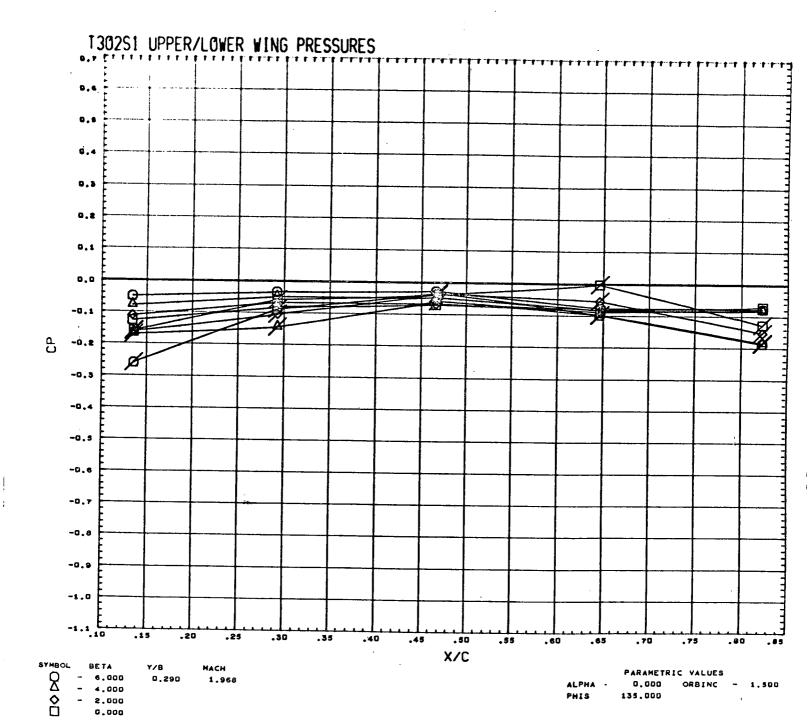
(873032) OPEN MSFC TWT 55D LAUNCH PRESSURES T302SI UPPER WING
(C73032) FLAGGED MSFC TWT 55G LAUNCH PRESSURES T302SI LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873032) OPEN MSFC TWT 550 LAUNCH PRESSURES T30281 UPPER WING

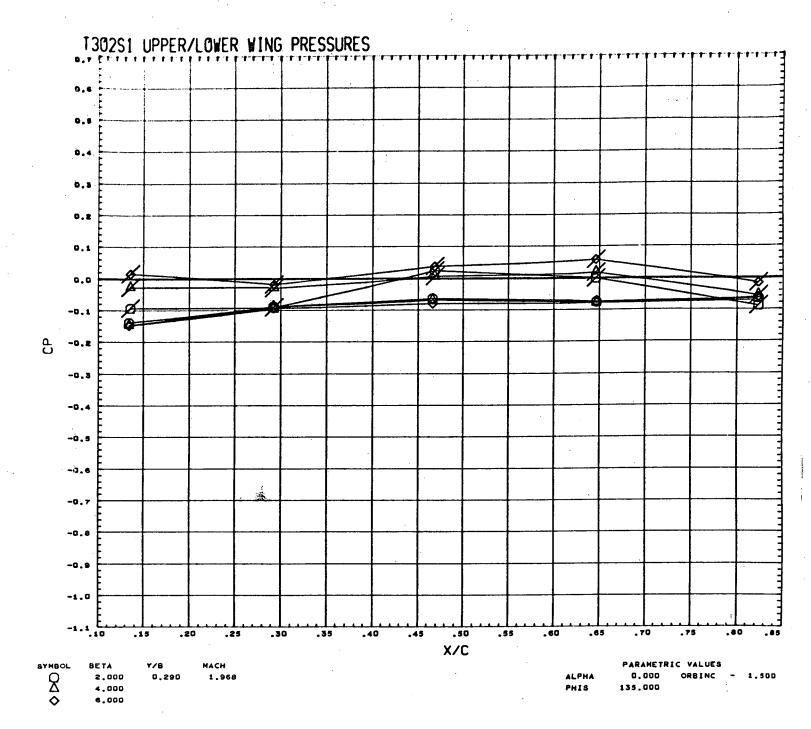
(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T30281 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

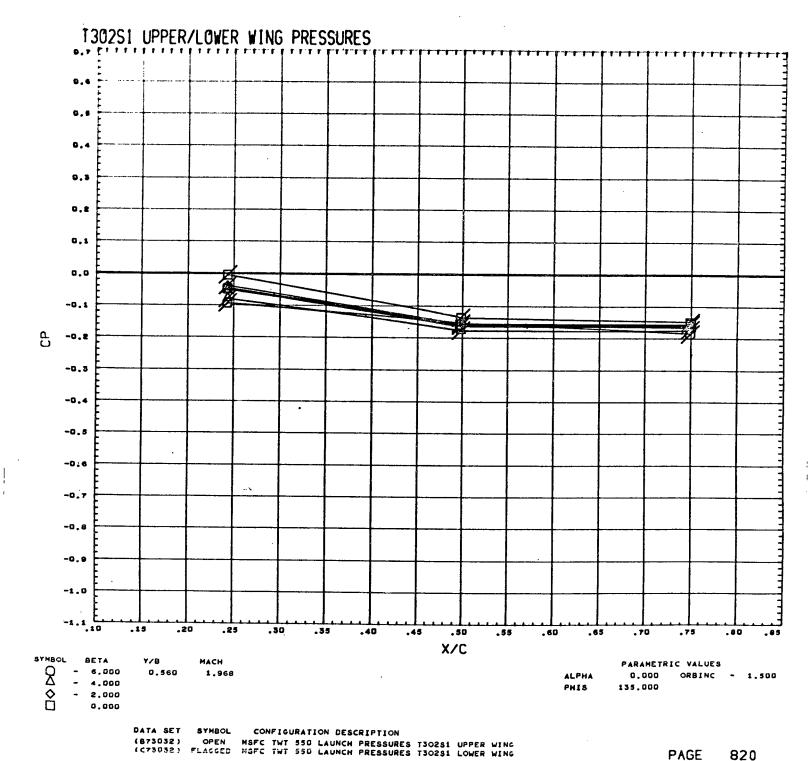
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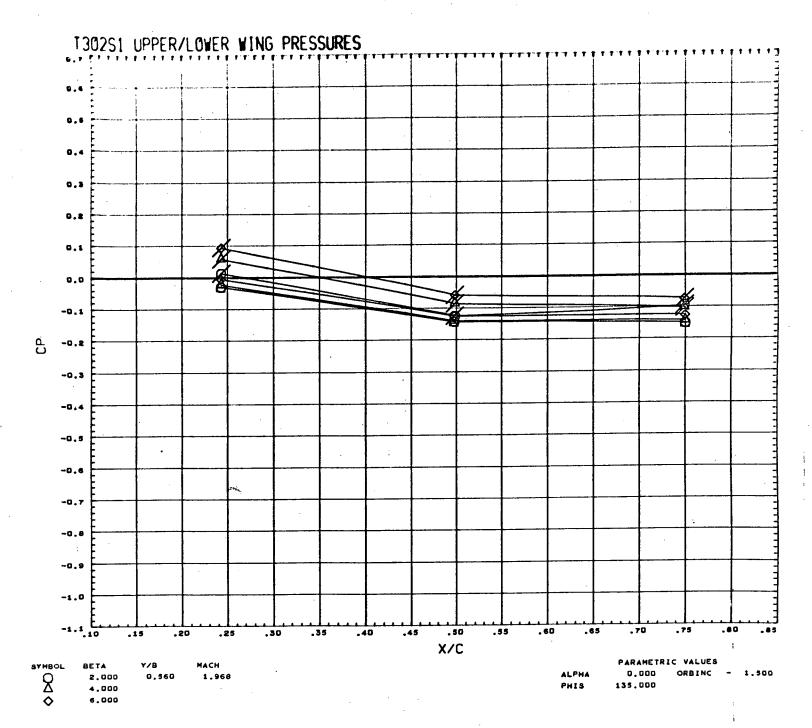
(C73032) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T30281 LOWER WING



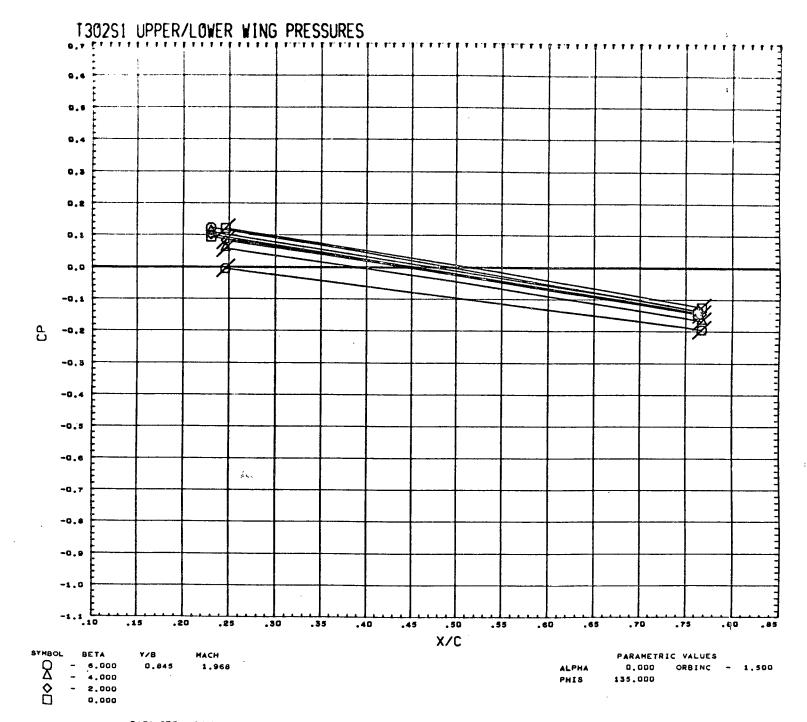
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(B73032) . OPEN MSFC TWI 550 LAUNCH PRESSURES T302S1 UPPER WING(C73032) FLAGGED MSFC TWI 550 LAUNCH PRESSURES T302S1 LOWER WING

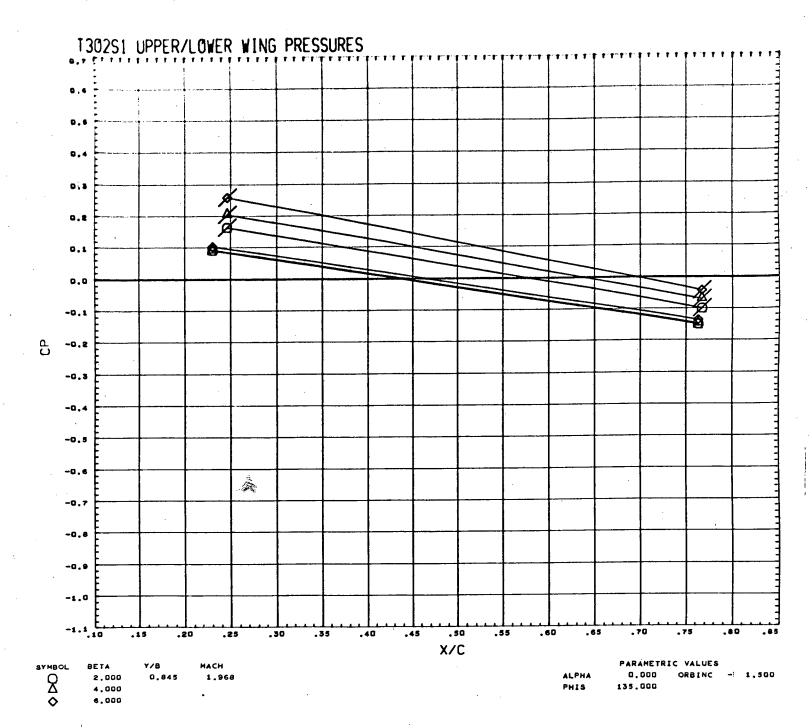




DATA SET SYMBOL CONFIGURATION DESCRIPTION
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(C73032) FLAGGED MSFC TWT 55D LAUNCH PRESSURES T302S1 LOWER WING

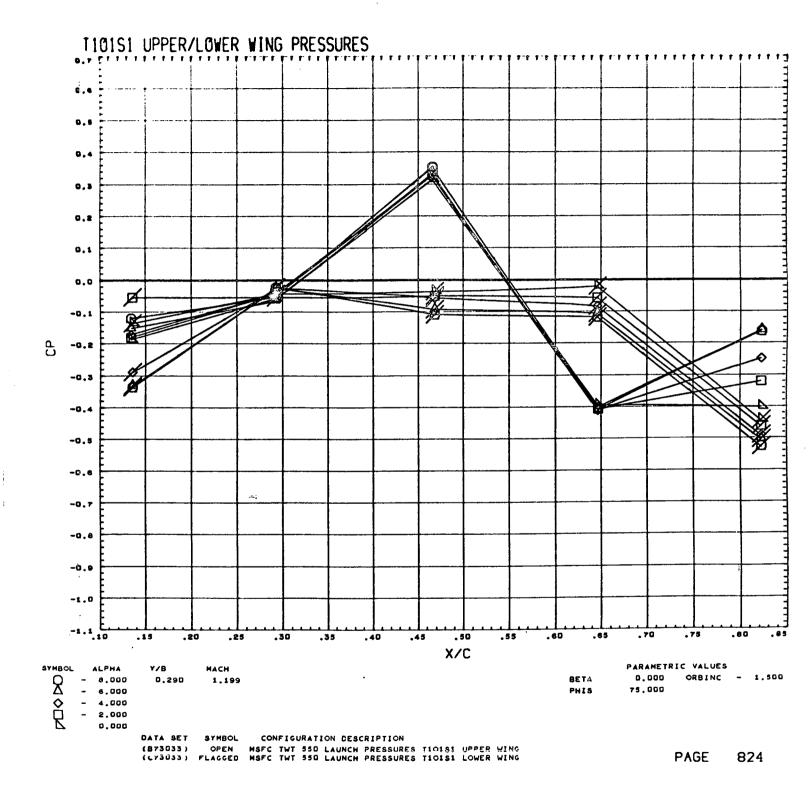


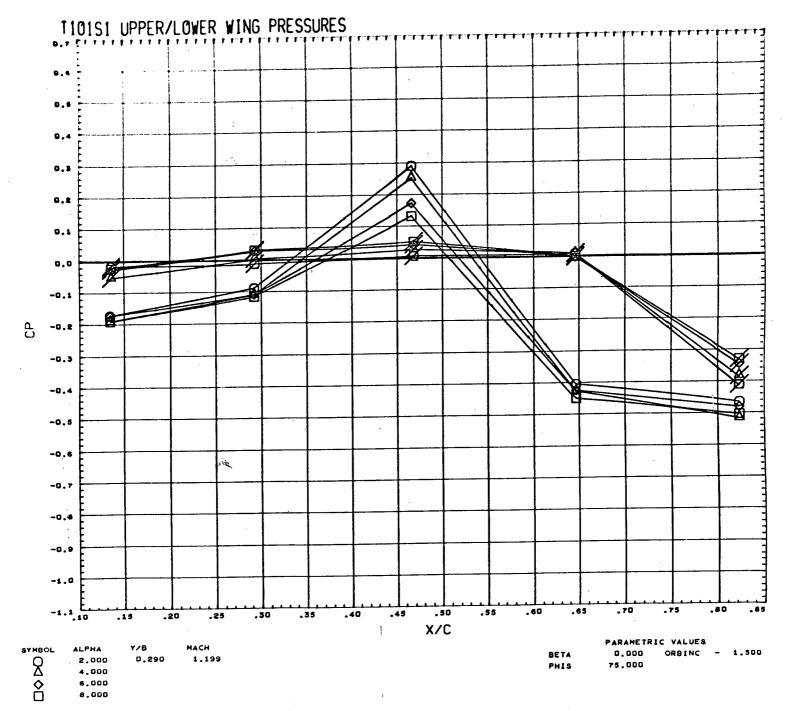
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(C73032) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T302S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73032) OPEN MSFC TWT 550 LAUNCH PRESSURES T302S1 UPPER WING
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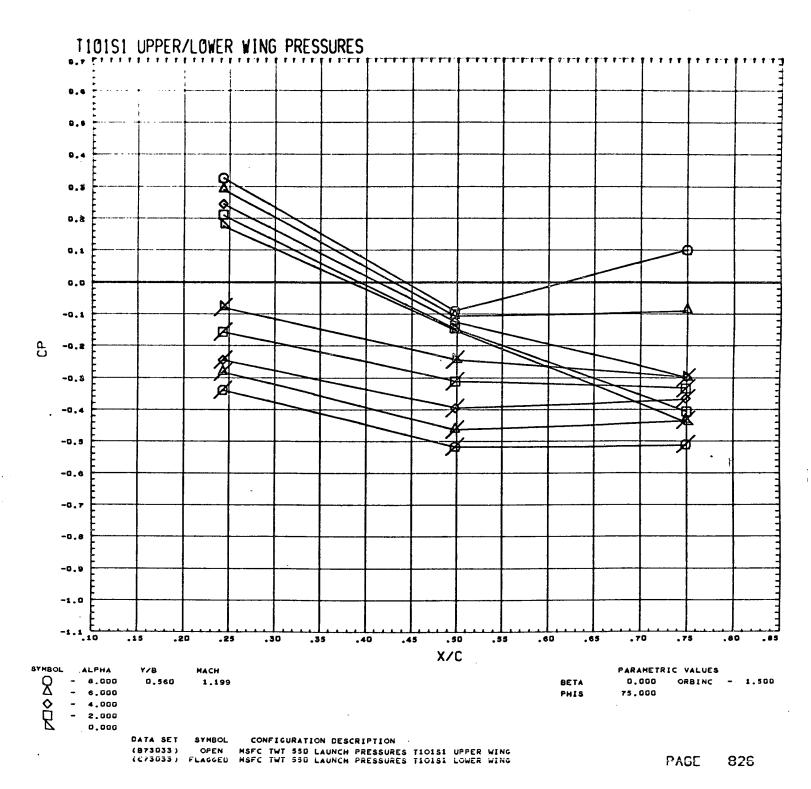


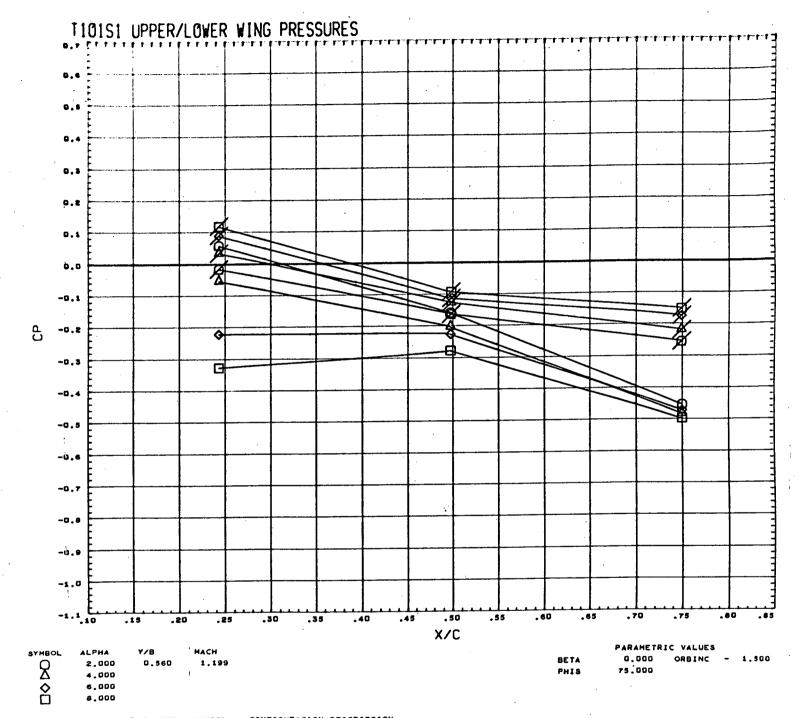


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(C73033) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T10181 LOWER WING

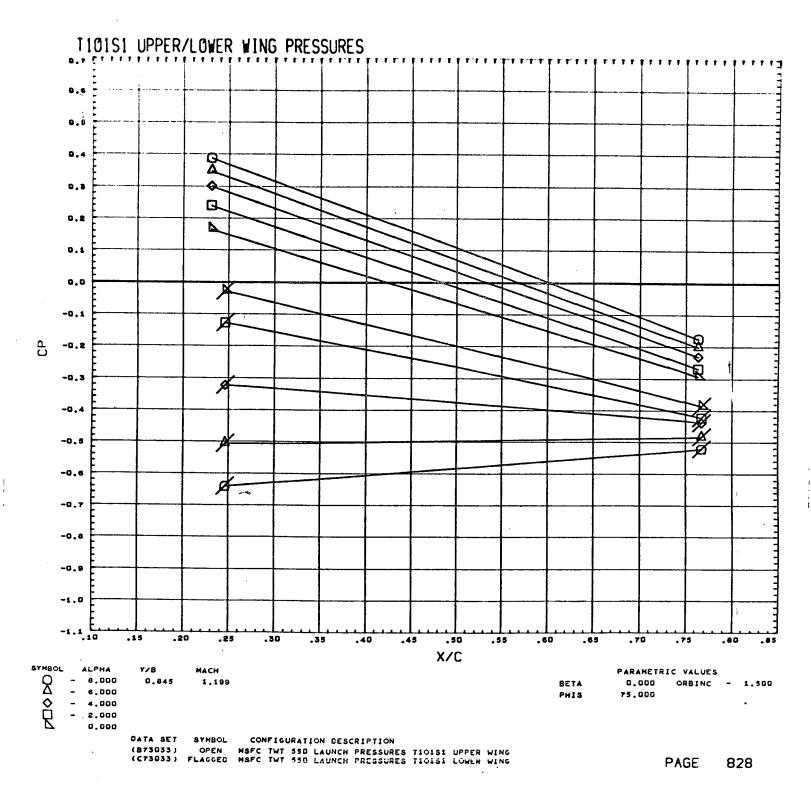


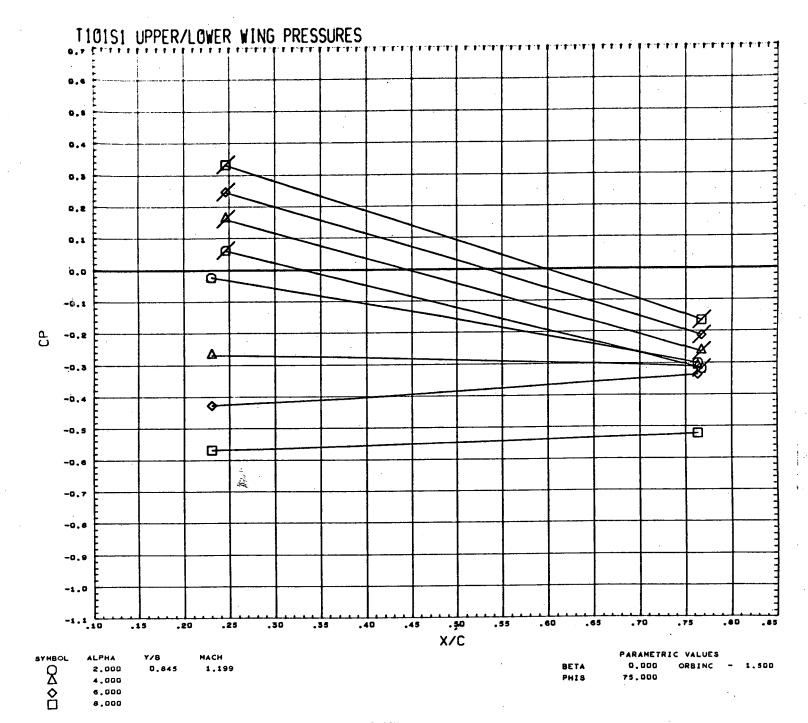


DATA SET SYMBOL CONFIGURATION DESCRIPTION

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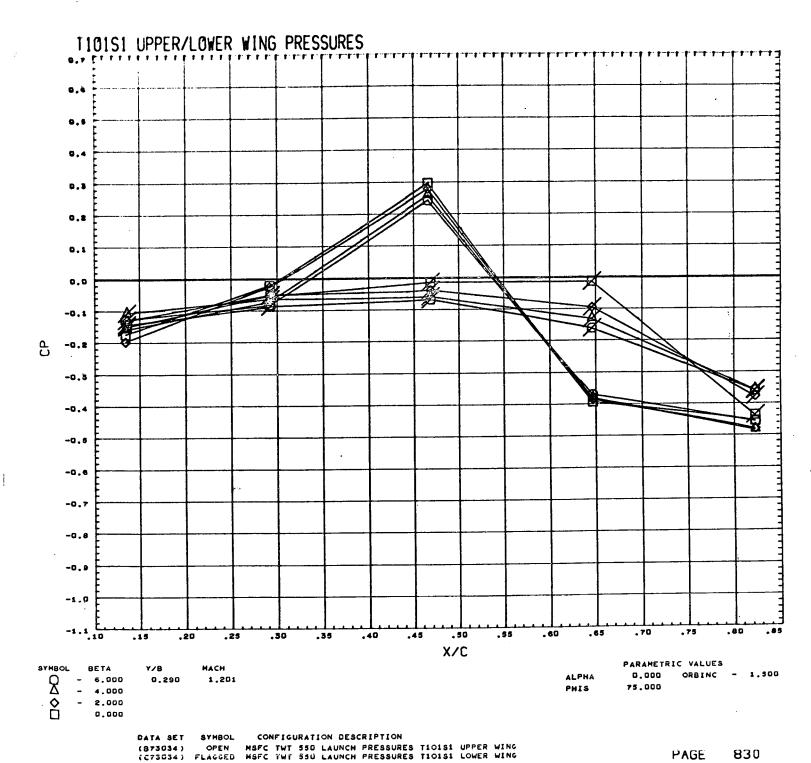
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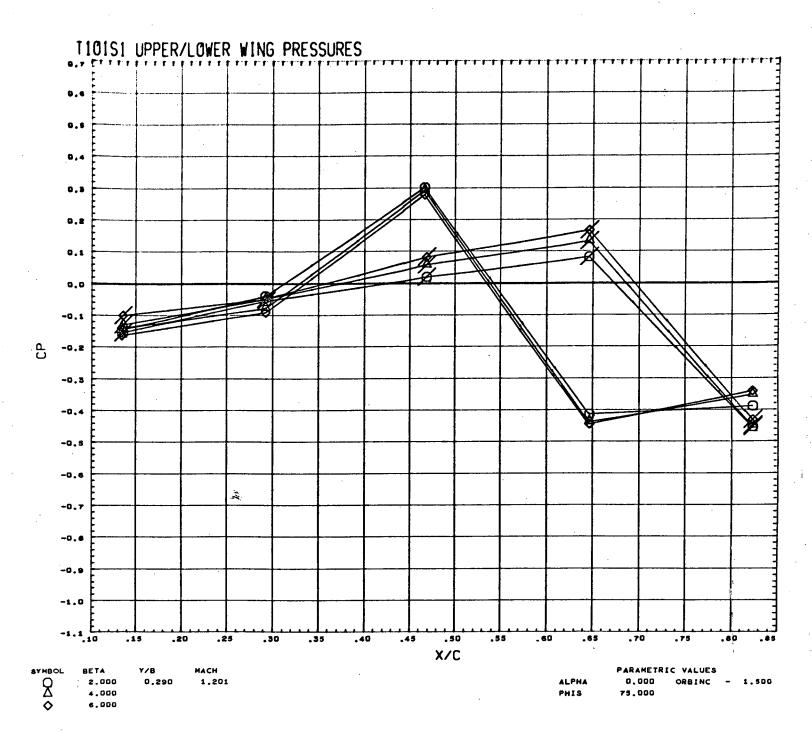




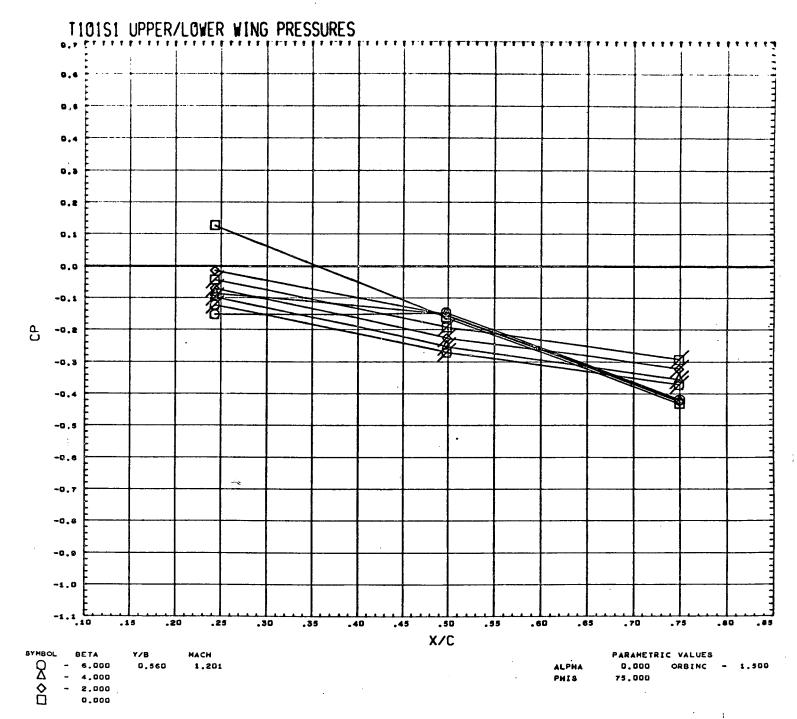
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(873033) OPEN MSFC TWT 550 LAUNCH PRESSURES T101S1 UPPER WING
(C73033) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T101S1 LOWER WING

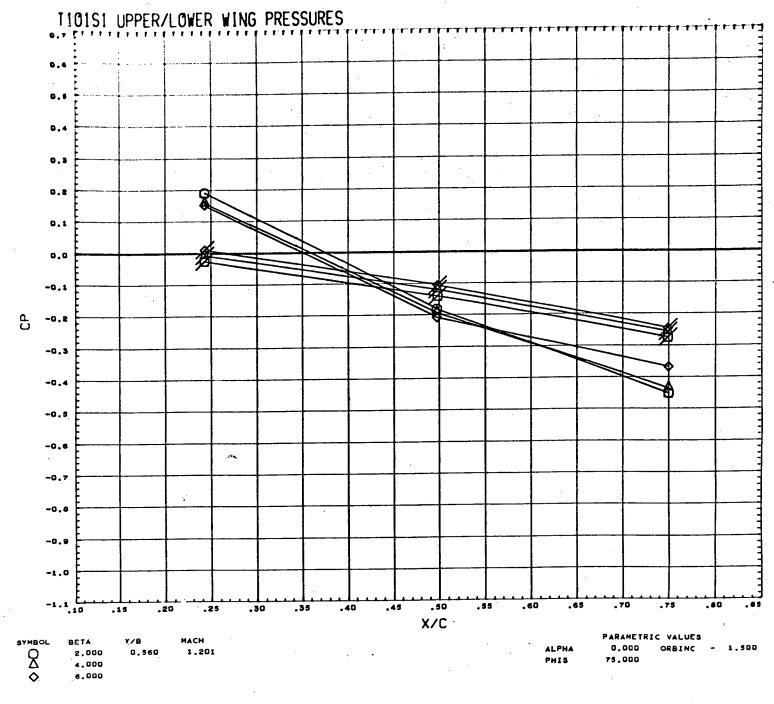




DATA SET SYMBOL CONFIGURATION DESCRIPTION :
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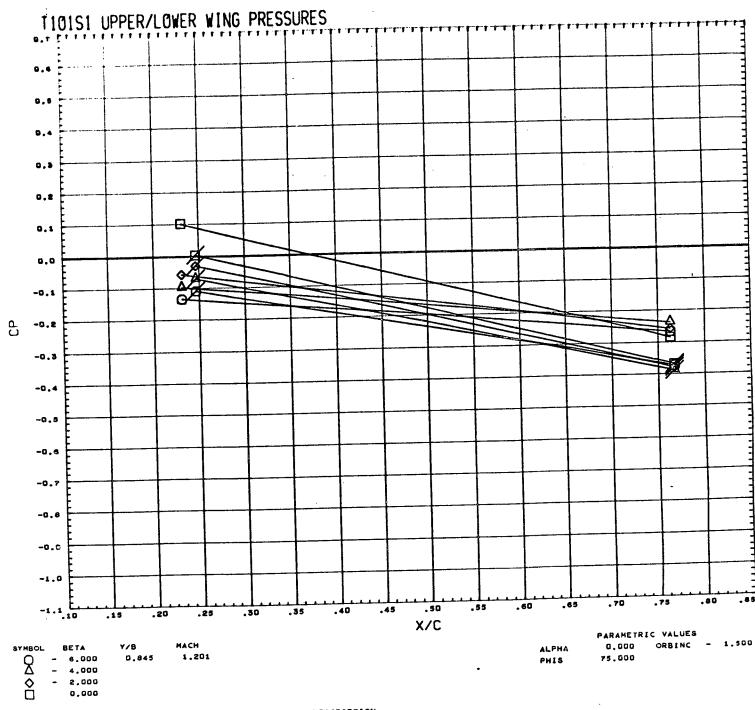
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(873034) OPEN MSFC TWT 550 LAUNCH PRESSURES TIO1S1 UPPER WING (C73034) FLAGGED HSFC TWT 550 LAUNCH PRESSURES TIO1S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

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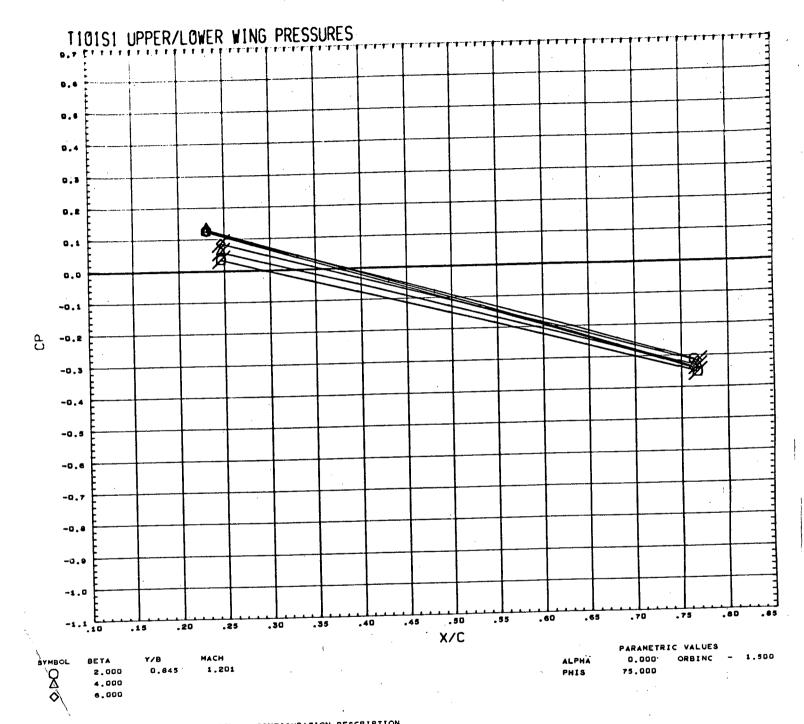
(C73034) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T101S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(873034) OPEN MSFC TWT 550 LAUNCH PRESSURES T101S1 UPPER WING

(C73034) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T101S1 LOWER WING



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(B73034) OPEN MSFC TWT 550 LAUNCH PRESSURES T101S1 UPPER WING

(C73034) FLAGGED MSFC TWT 550 LAUNCH PRESSURES T101S1 LOWER WING